

THE

RAILWAY GAZETTE

Price: Two Shillings

FRIDAY, DECEMBER 1, 1961

Annually £5 by post

Modernisation in practice



One of the 2,000 h.p. 1 Co-Co 1 Type 4 diesel-electric locomotives supplied by 'ENGLISH ELECTRIC' to the Eastern Region of British Railways shown hauling the 'Master Cutler'.

Two hundred of these 2,000 h.p. diesel-electric locomotives were ordered from 'ENGLISH ELECTRIC'. They are used to haul express passenger trains for most regions of British Railways.

'ENGLISH ELECTRIC'

in association with VULCAN FOUNDRY • ROBERT STEPHENSON & HAWTHORNS
TODD & CO

BELFORT

*... the real wood
veneer laminate with
the melamine surface*



Belfort Afrormosia used for paneling in the new Railway Coaches. Photograph reproduced by permission of London Midland Region, British Railways.

Designers have for centuries found that fine woods are the well-tested medium of their art.

In the field of design "Belfort," with its superb appearance and durable surface qualities is available in an extensive range of woods to appeal aesthetically to interior designers and railway carriage builders.

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"Belfort" laminates are available in panels 8' x 4' and in two thicknesses, $\frac{1}{4}$ " and $\frac{3}{8}$ ".

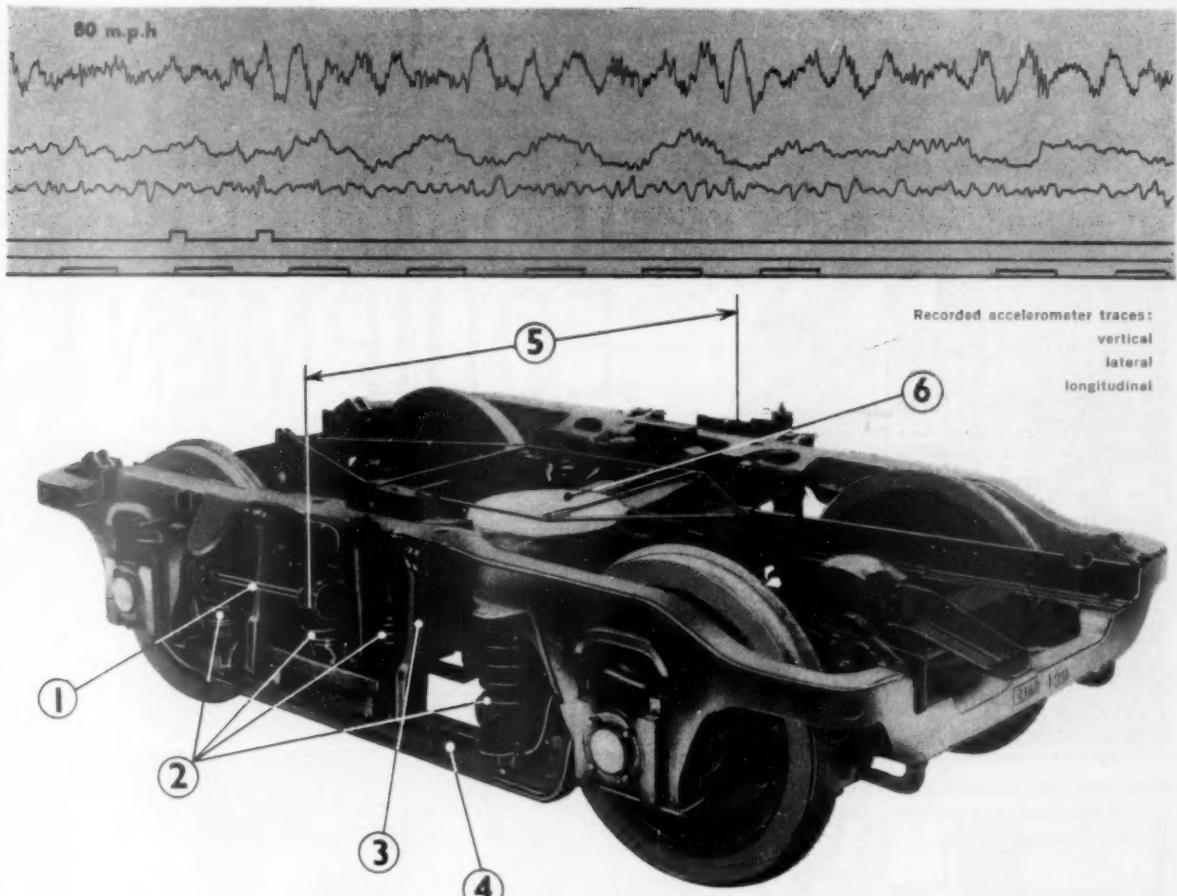


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C. H. N. VENEER MILLS, CHISENHALL ROAD, LONDON, E.3 · Phone: Advance 2005

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One-piece Cast Steel Bogie Frame ensuring maximum strength with minimum weight. Metal can be distributed evenly to maximum effect.

- 1 Bolster Anchor. Transfers tractive and braking forces to bogie frame through rubber pads. Eliminates wearing plates and their attendant troubles.
- 2 All Coil Spring suspension. Saves weight, provides smoother ride.
- 3 Long inclined Swing Links, giving soft lateral ride.
- 4 Equaliser Beam for more even wheel loading and safety.
- 5 Wide spacing of bolster springs permits the use of softer suspension, hence more comfortable ride, whilst retaining good roll stability.
- 6 Large central bearing incorporating friction material steadies bogie, prevents "hunting" and "shimmy," eliminates side bearers.

ENGLISH STEEL
CASTINGS CORPORATION LTD

River Don Works, Sheffield

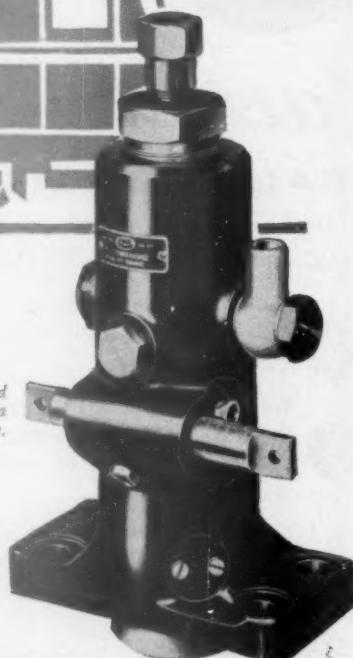
A WHOLLY-OWNED SUBSIDIARY OF ENGLISH STEEL CORPORATION LTD.

FUEL INJECTION EQUIPMENT

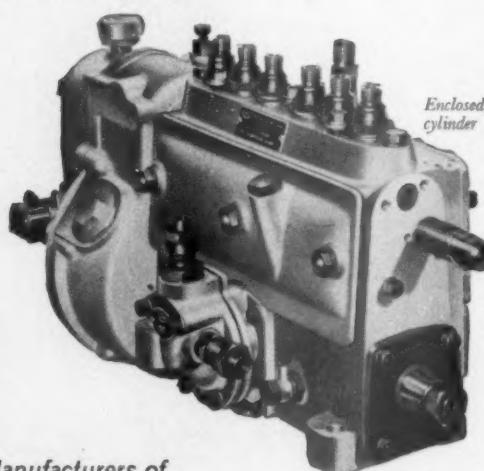
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Single flange mounted
injection pump for a
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C.A.V. manufacture fuel injection equipment for main line, goods, shunting or narrow gauge locomotives, railcars or railbuses. Manufacturing resources are unequalled, and engine manufacturers are offered the benefits of unrivalled facilities for research, design and development. C.A.V. equipment is backed by the world's finest service organisation covering over 100 countries.



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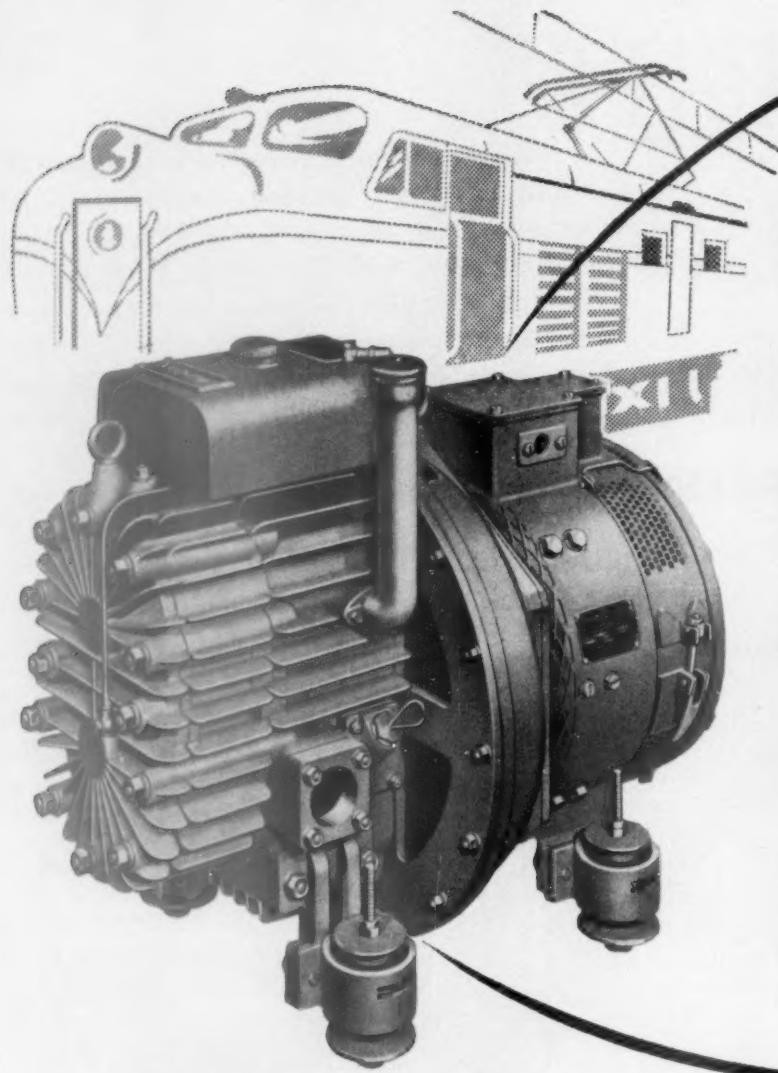
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Westinghouse
AIR CONTROL
EQUIPMENT

This giant 250 ton crane has been specially built for the Quebec Cartier Mining Company by Messrs. Cowans Sheldon Ltd. of Carlisle. It is intended for use in the building of Port Cartier on the North shore of the St. Lawrence estuary and is designed to work in temperatures of 70° F. below. Westinghouse Air Control Equipment is installed to operate the various clutches and the reverse gear. It is on really tough jobs like this that the smooth efficiency and enduring reliability of Westinghouse Equipment is revealed to the full.

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VOLUME 125 c.f.m.

NOTE: Large capacity
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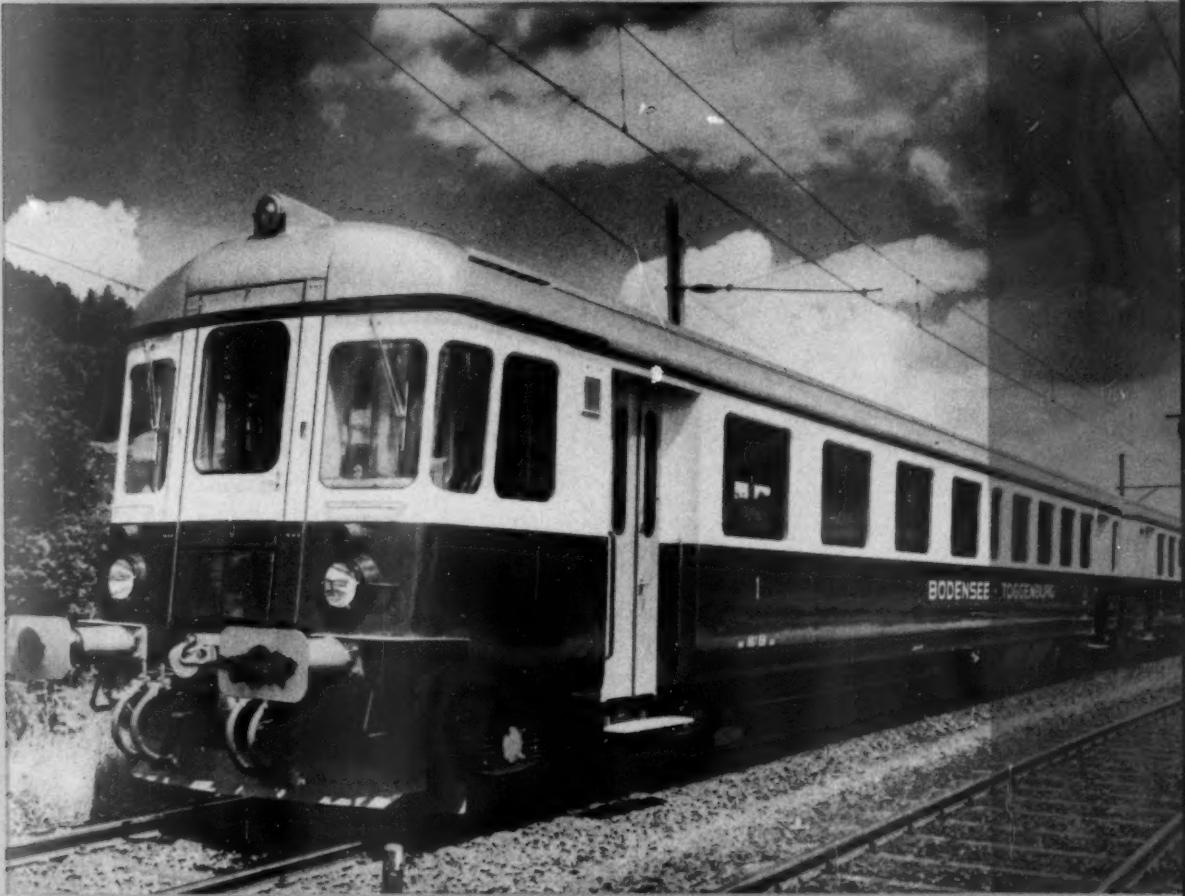
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Motor coach and one of the trailer coaches built for the new electric push-and-pull train of the Bodensee-Toggenburg Railway (Switzerland).



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Part of the G.E.C. contribution to the modernisation of British Railways-ten 100 mile/h.25kV locomotives for express passenger and goods trains.

Rely on the experience of

G.E.C.

486

G.E.C. (ENGINEERING) LIMITED

TRACTION DIVISION

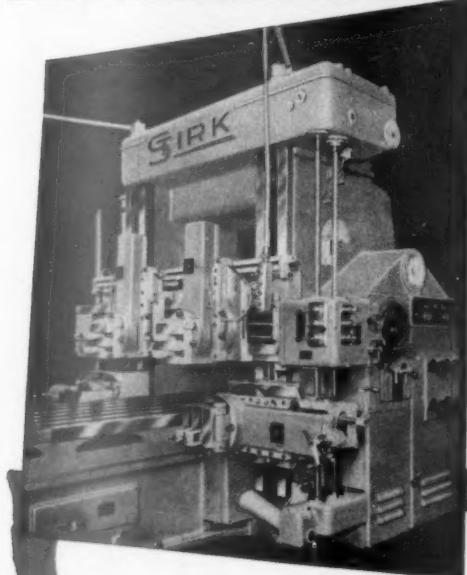
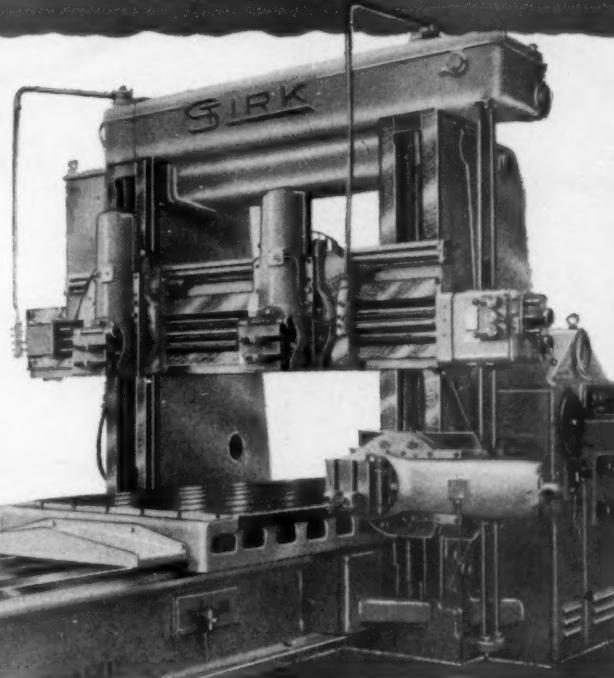
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PLANERS

SET THE

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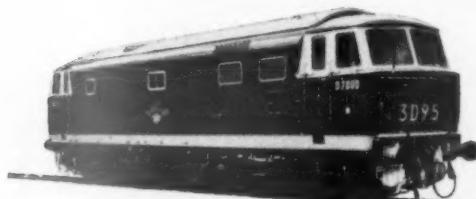
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CONTROL EQUIPMENT

FOR 95 DIESEL HYDRAULIC LOCO'S



The 95 new Type 31,700 h.p. Diesel Hydraulic Locomotives now being supplied by Beyer Peacock (Hymek) Ltd. for the Western Region of British Railways are being equipped with control equipment and dynostarters by Brush Electrical Engineering Co. Ltd.

The major part of the control equipment is located in a compact cubicle at the rear of the driving cab, and is designed to ensure automatically the correct starting and engine running conditions. Principle feature of the driver's desk is the master controller with handles designed for maximum comfort and smart appearance.



Loughborough, England

BRUSH ELECTRICAL ENGINEERING COMPANY LIMITED

A MEMBER OF

HAWKER SIDDELEY INDUSTRIES





Save time and money

WITH COMPRESSED-AIR POWER

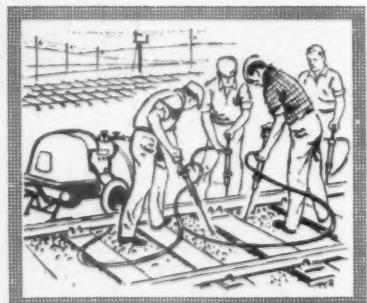
Manpower . . . time . . . money . . . how much are you wasting with out-of-date methods of permanent way and bridge maintenance?

A Hymatic-Hydrovane compressor will enable you to tackle track and bridge work with powerful pneumatic tools. Powered impact wrenches, spike drivers, tampers, rail saws, rotary drills, riveters, grinders, concrete breakers will make the whole job a simple mechanised one.

Already in use by British Railways and several overseas railways, the Hymatic model 98P100 can be operated without special training. It is easily handled. The compressor is normally operated at the trackside. When used without its undercarriage it gives plenty of clearance in the six-foot way.

Low first cost and cheap-to-run Hydrovane efficiency, with compactness, smoothness, speed and reliability—there are so many good reasons for choosing Hymatic. Write for further details of the Hymatic-Hydrovane Type 98P100 for railway work.

Using two impact wrenches for tightening chair-bolts more quickly.



98P100 can operate up to four tampers with power, speed and precision control.

Hymatic

Quicker on the spot—
HYDROVANE COMPRESSORS

THE HYMATIC ENGINEERING CO. LTD • REDDITCH • WORCESTERSHIRE • REDDITCH 3621

HYDROVANE
HYMATIC
TGA M3/4

GREER-MERCIER

ACCUMULATORS : NEW PROJECTS



**30 TON
LOAD
EMPTIED
IN 3
SECONDS**

A NEW APPROACH TO FAST UNLOADING

1100 coal wagons operated successfully for over two years by Electricité de France, proves the efficiency of hydraulically-actuated bottom doors. The 30-ton load, when released, slams open the bottom doors, which actuate pistons to store oil under pressure in a hydro-pneumatic Accumulator. Operation of a return lever permits this energy to close the doors automatically.

The hand-controlled system used in France is readily convertible to remote control from track side cam-plates.

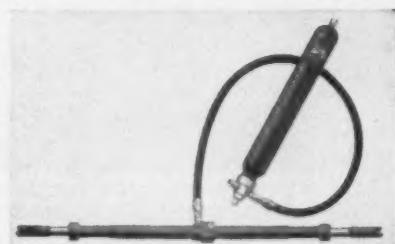
**A 30-ton load fully opens the bottom doors in 0.2 seconds.
The wagon is empty in three seconds.**

This equipment is now used in France,
Spain and Belgium.

*For the British Isles and the sterling area,
Fawcett Preston supply the
complete hydraulic equipment.*



FAWCETT
M



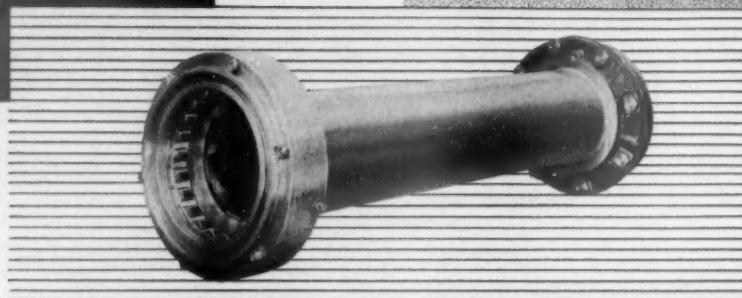
*Manufactured under licence from Greer
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FAWCETT PRESTON & COMPANY LIMITED

BROMBOROUGH, CHESHIRE Tel: ROCK FERRY 6181

Branch Offices: London and Birmingham *M* Metal Industries Group

FP 200



4,332 AXLEBOXES and 1,332 SUSPENSION- UNITS for L.T.E.

London Transport Executive, as the first stage of its re-equipment of the "Underground" ordered new "Silver" rolling-stock for the Piccadilly Line. This stock, seventy six seven-car train sets, is fitted with Hoffmann Roller Bearing Axleboxes, and Hoffmann Roller Bearing Suspension Units.

London Transport Executive is now also re-equipping the Central and Metropolitan Lines, and has placed orders for a further 4,332 Hoffmann Axleboxes and 1,332 Suspension Units to be fitted to the new "Silver" stock coming into service on these lines.

These orders continue an association dating back to 1935 when Hoffmann Axleboxes were first supplied to the "Underground".

HOFFMANN BALL AND ROLLER BEARINGS

Hoffmann Axleboxes are in universal use on all types of locomotives, electric stock and general rolling stock as well as on heavy industrial vehicles. There is also wide scope for Hoffmann traction motor suspension units on electric stock, diesel electric and electric locomotives. Whatever the project we shall be pleased to help.



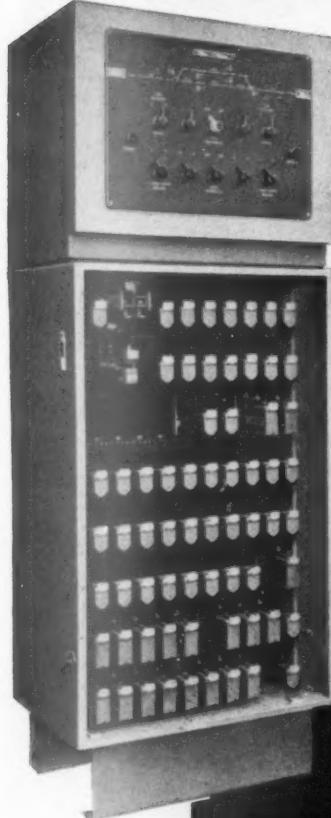
The illustration shows engineers assembling bodies for the "Silver" coaches built for the Piccadilly Line by Metropolitan-Cammell Carriage and Wagon Company Ltd., who, with Cravens Ltd., and British Railways are supplying the new "Silver" trains for the Central and Metropolitan services.



HEAD OFFICES AND WORKS:

THE HOFFMANN MANUFACTURING CO. LTD. (P.O. BOX 7),
CHELMSFORD, ESSEX. TELEPHONE: CHELMSFORD 3151 TELEX NO: 1951

Greater speed and simplicity in remote signal control

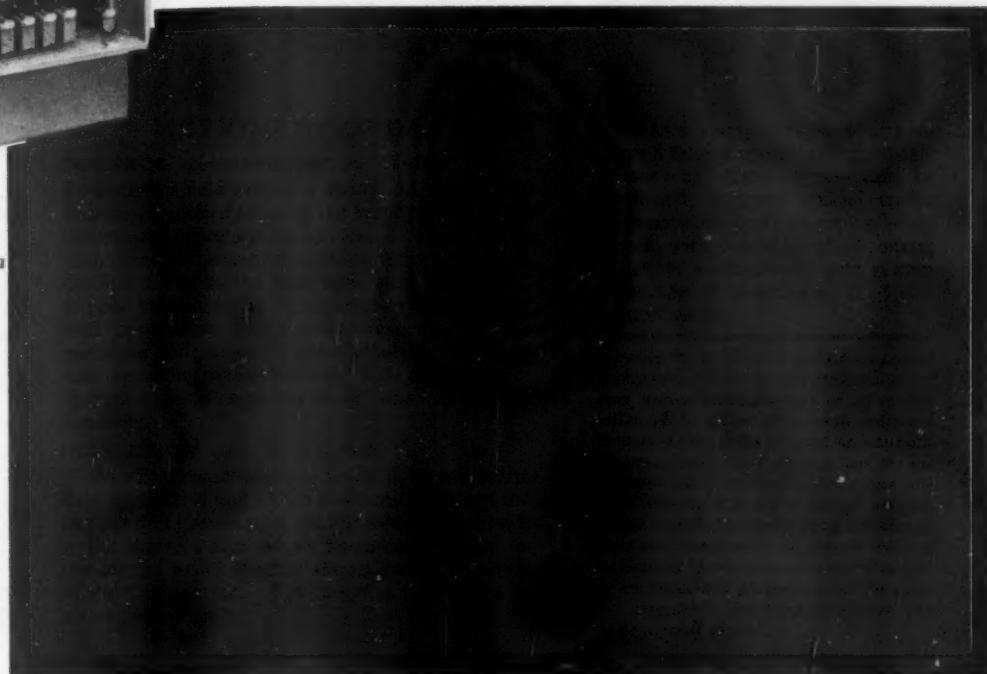


*View of Type 'S'
Control panel for
remotely operating a
station on a single
line of railway.
Front cover has
been removed to
show relays.*

WITH THE

AEI-GRS Type S remote control system

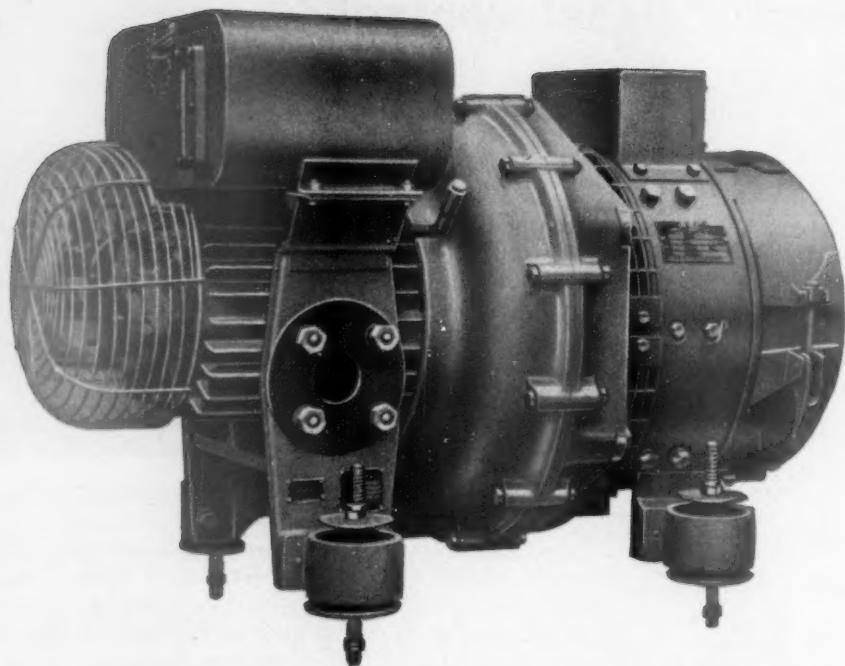
The Type S remote control system, developed by AEI-GRS, provides a swift, simple and economical means of remote control and indication, using a minimum of apparatus. Designed specifically for remote control of a single location this 'synchronous stepping' code system is based on a unique principle employing the free swings of two mechanical oscillators—one at each end of the circuit—to create the steps of the code.



Associated Electrical Industries—GRS Limited

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TEMPLE BAR 3444



VACUUM BRAKE EXHAUSTERS

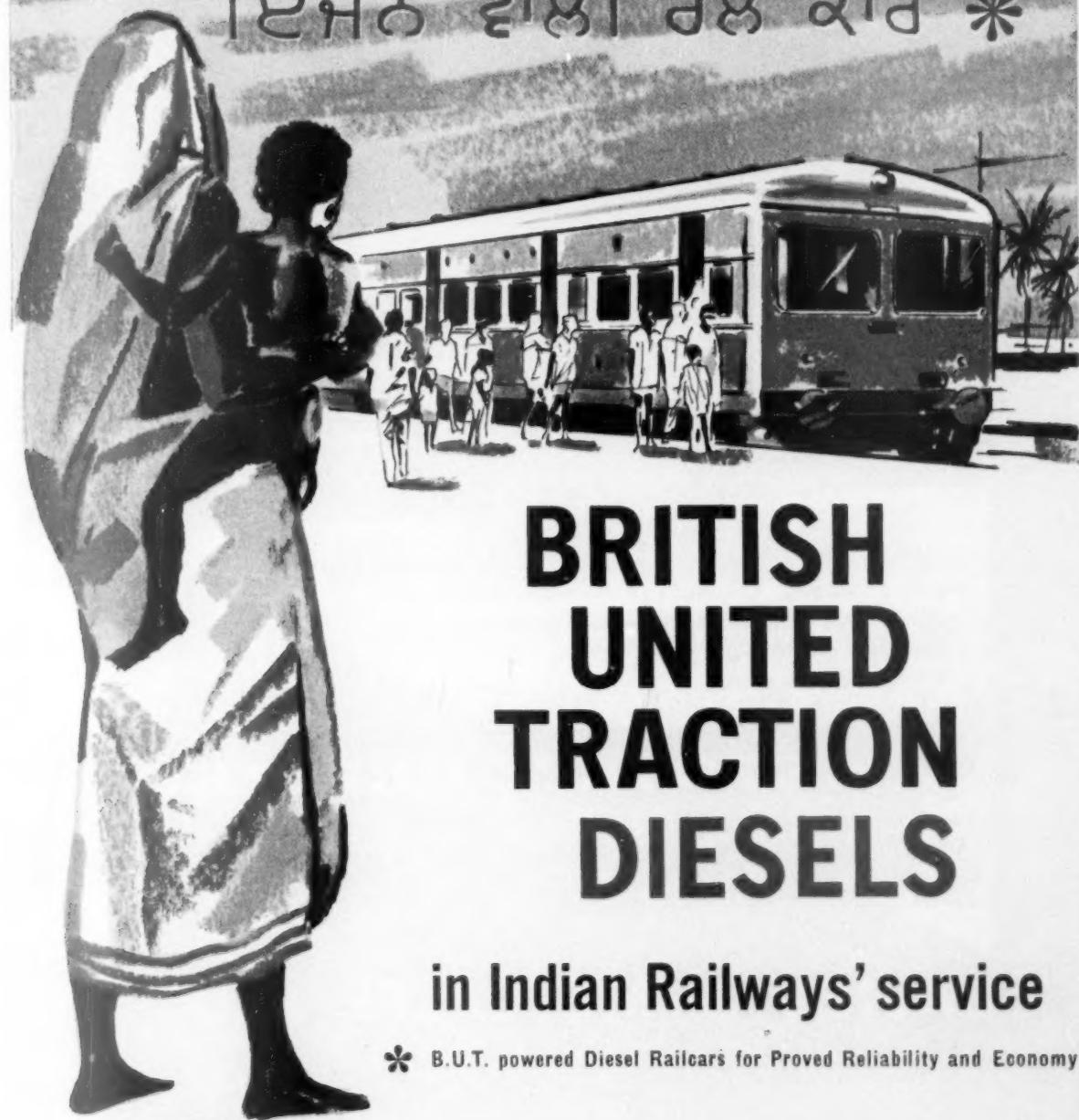
The Consolidated Brake—Reavell Exhauster illustrated here offers maximum efficiency with minimum weight. These latest Flange-Mounted Exhausters are now being supplied to British Railways. For further details write to:

**THE CONSOLIDATED
BRAKE & ENGINEERING CO., LTD.**

SLOUGH, BUCKS, ENGLAND

(A member of the G. D. Peters Group.)

ਤੁਰੋਸਾ, ਤਸੱਲੀ, ਅਤੇ ਘਟ ਖਰਰ
ਸੇਵਾ ਲਈ ਬੀ: ਧੂ: ਟੀ: ਟੀ ਡੀਜ਼ਲ
ਇੰਜਨ ਵਾਲੀ ਰੇਲ ਕਾਰ *



BRITISH UNITED TRACTION DIESELS

in Indian Railways' service

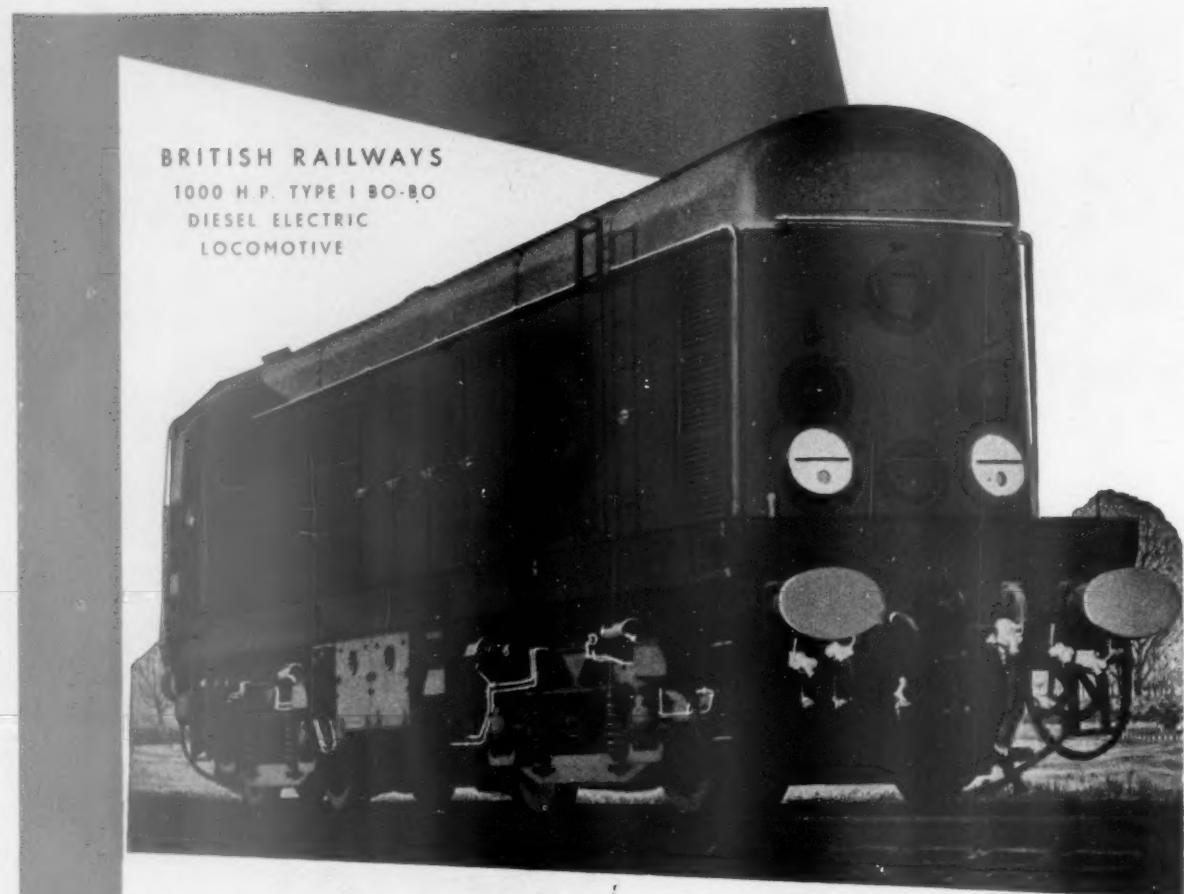
* B.U.T. powered Diesel Railcars for Proved Reliability and Economy



BRITISH UNITED TRACTION LIMITED

Uniting the Rail Traction Resources of A.E.C. and Leyland

96 PICCADILLY • LONDON W.1 • TELEPHONE: GROSVENOR 7121



50 OF THESE LOCOMOTIVES ARE NOW IN SERVICE ON BRITISH RAILWAYS (AND A FURTHER 78 BUILDING). CONSTRUCTED BY THE ENGLISH ELECTRIC CO. LTD.,

VULCAN FOUNDRY LTD., AND MESSRS. ROBERT STEPHENSON & HAWTHORNS LTD., FOR MIXED TRAFFIC SERVICE.

THEY ARE EQUIPPED WITH—

METCALFE-OERLIKON
PATENTED
AIR AND VACUUM BRAKE EQUIPMENT

Manufactured at the Romiley and Dukinfield Works of

DAVIES & METCALFE LTD
ENGINEERS, ROMILEY · Tel. WOO 2626 (3 LINES)

MAKERS OF MODERN AIR BRAKE EQUIPMENT AND ENGINEERS
TO THE LOCOMOTIVE INDUSTRY SINCE 1870



An adequate and commensurate REWARD will be paid for information leading to the recapture of the above office junior who is under the delusion that she has lost the address of **ASSOCIATED LEAD** and who now fears that her employers are unable to obtain supplies of **RED LEAD PAINTS & RUSTODIAN CALCIUM PLUMBATE PAINTS**. This girl is suffering from strong guilt feelings and may have assumed an alias.

This announcement is issued for and on behalf of

ASSOCIATED LEAD MANUFACTURERS LIMITED,

CLEMENTS HOUSE, 14 GRESHAM STREET, LONDON, E.C.2. CRESCENT HOUSE, NEWCASTLE. LEAD WORKS LANE, CHESTER.

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- * Manual or automatic working.
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- * Normal revertive calls can be made.
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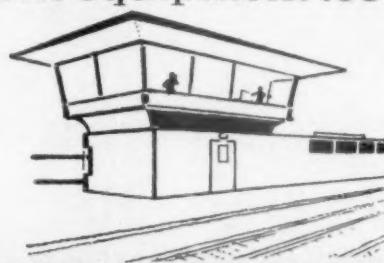
The TMC extensible LINE CONNECTOR takes them all!

A FULL TELEPHONE SERVICE for twenty-two subscribers via 4 pairs of wires. Incredible, but true! Normally such a service would demand 22 pairs of wires, but when the TMC Extensible Line Connector No. 1 is installed, 18 pairs of wires are not needed. The system can be installed for less than 22 subscribers if necessary. For instance, 10 subscribers need only 2 junctions. These can be extended as the number of subscribers increase. The economies of such a system are obvious: lower installation costs and certainly less maintenance costs.

TMC have other communications equipment too!

Carrier Telephone and Telegraph Systems
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Relays, Counters, Keys.

A letter or telephone call will put TMC at your service.



TMC

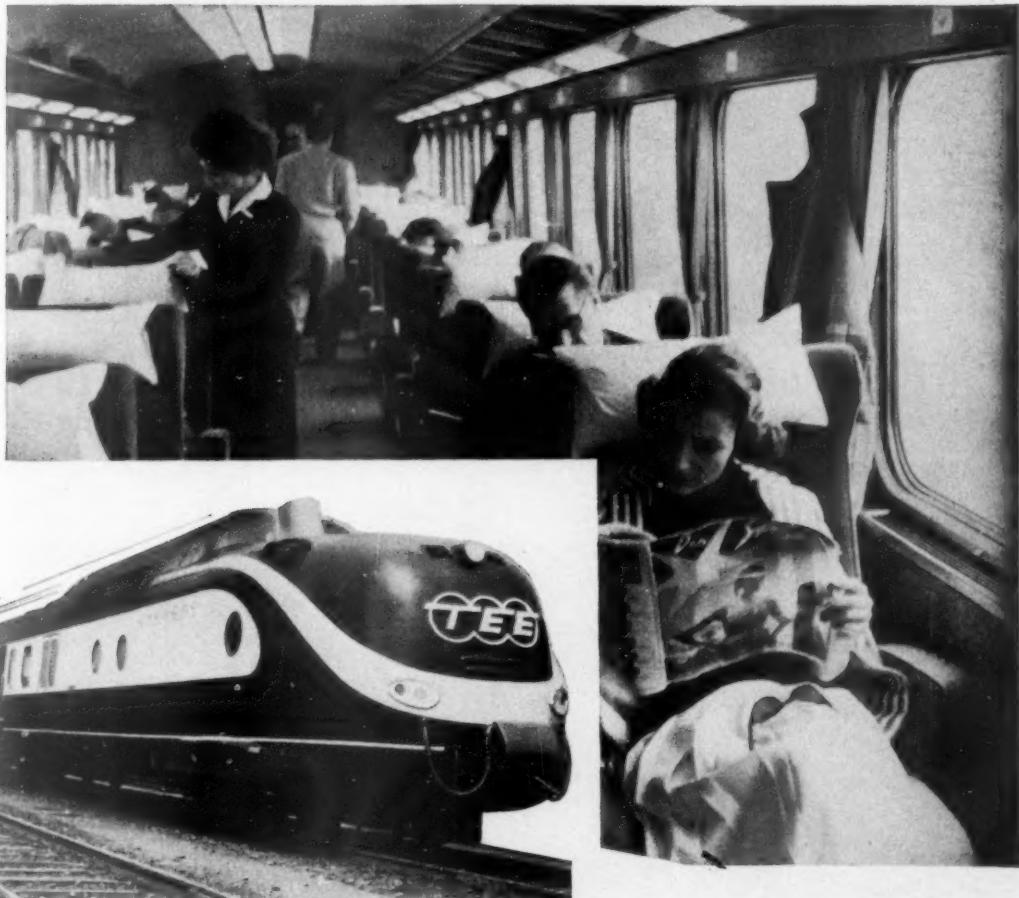
RAILWAY TELECOMMUNICATION EQUIPMENT

TELEPHONE MANUFACTURING COMPANY LIMITED

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TRAVELLING COMFORT IN MODERN EXPRESS TRAINS



The present standard of comfort makes travelling in the modern express trains a special pleasure. It is, above all, the dust-free, temperature-controlled air that gives travellers great ease. This comfort is made possible by air-conditioning equipment running through the whole train and hidden from the eye—a marvel of technical development.

For instance, all Trans Europ Express Trains of the German Federal Railways (TEE) are equipped with **Luwa** air-conditioning plants, system **Jettair**. For the air-conditioning equipment shown at the International Exhibition in Brussels we were awarded the Silver Medal. The passengers of the German Sleeping Car Company (DSG) and the Compagnie Internationale des Wagons-Lits et des Grands Express Européens (CIWL) enjoy the advantages of this proved air-conditioning equipment.

Among other overseas railways the Iranian State Railway for their modernization programme have equipped all 1st and 2nd-class passenger and dining cars with the **Jettair** system. The saloon train of H.M. the Shah, also, is being equipped with the **Luwa** system.

Top quality and continuous technical progress characterise the air-conditioning and pressure ventilation equipment built by us.

Luwa GmbH FRANKFURT AM MAIN, GERMANY

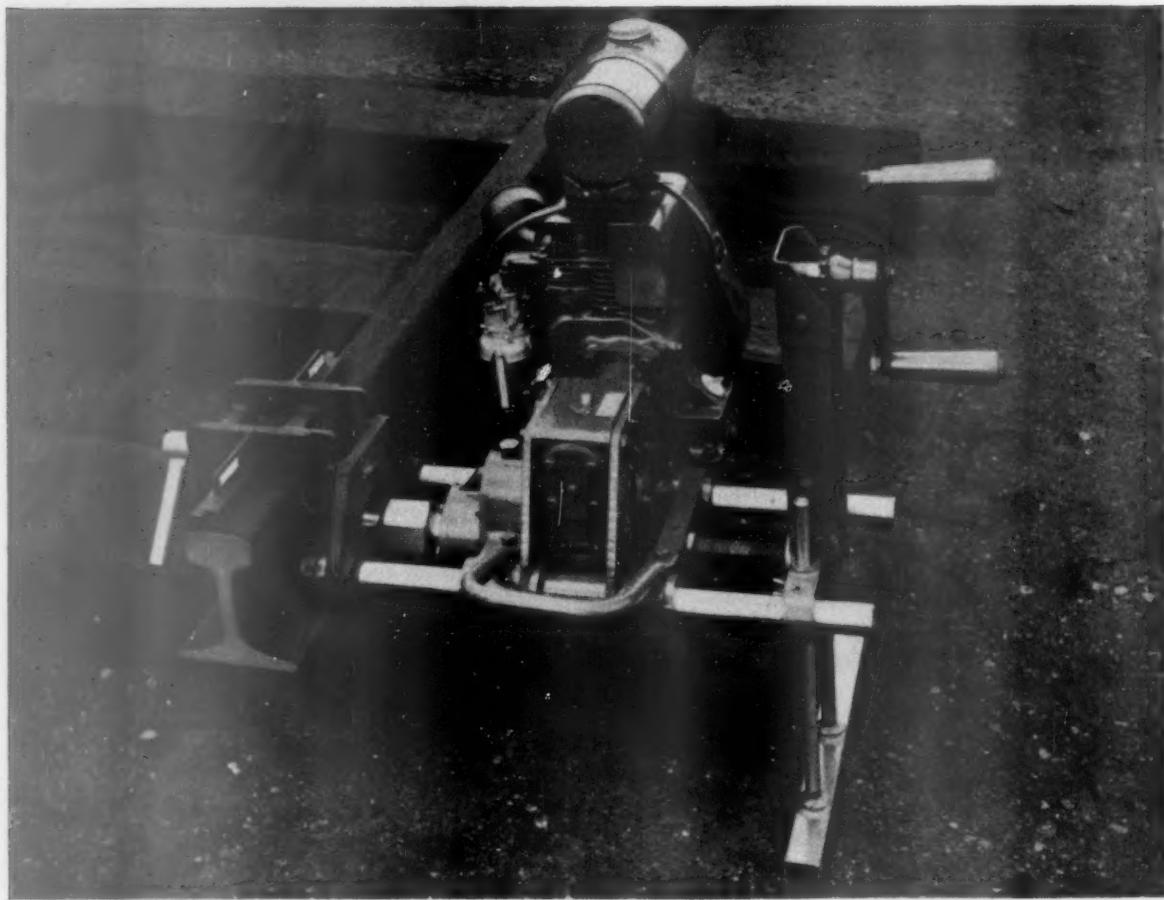
200-202, Hanauer Landstrasse. Telephone: 48541 Cable Address: Luwa Frankfurtmain. Telex: 0411775

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1961 MODEL POWERED RAIL DRILL



By permission of the Chief Civil Engineer Eastern Region, British Railways

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WESTMINSTER, LONDON, S.W.1

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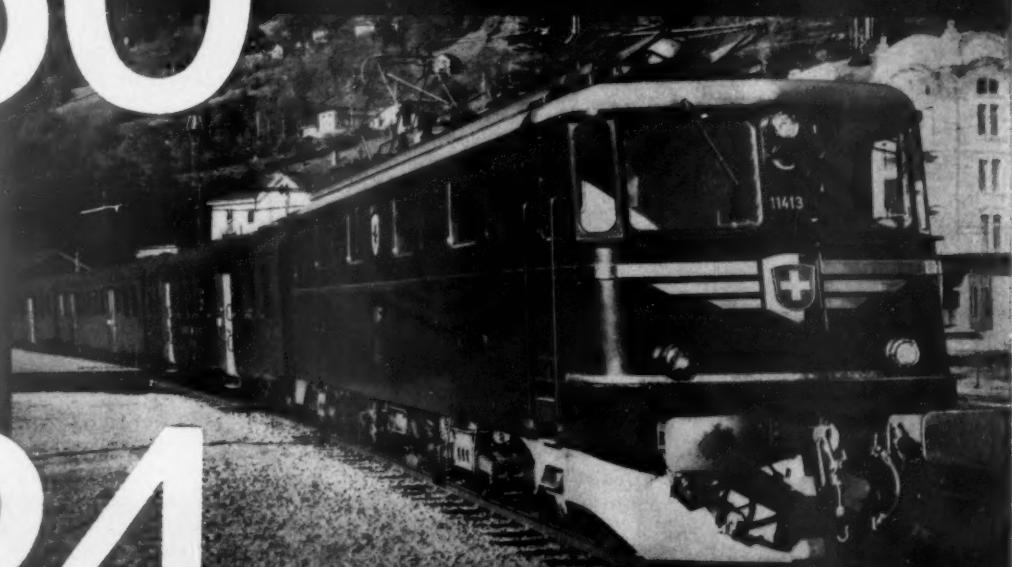
AUSTRALIA : DENMARK : INDIA & PAKISTAN : NORWAY : NEW ZEALAND : RHODESIA : SOUTH AFRICA

SLM

90 years experience
in design and manufacture
of locomotives and railcars!

50

of these 6000 HP Co-Co type locomotives are giving excellent service on the Gotthard and the Simplon lines of the Swiss Federal Railways.



24

To meet traction requirements due to increasing traffic 24 more of these powerful and reliable engines have been ordered lately.

35

A further contract for the supply of 35 Diesel-electric locomotives, 600 HP each, fitted with SLM traction Diesel engines has also been placed by the Swiss Federal Railways.



Swiss
Locomotive and Machine Works
Winterthur

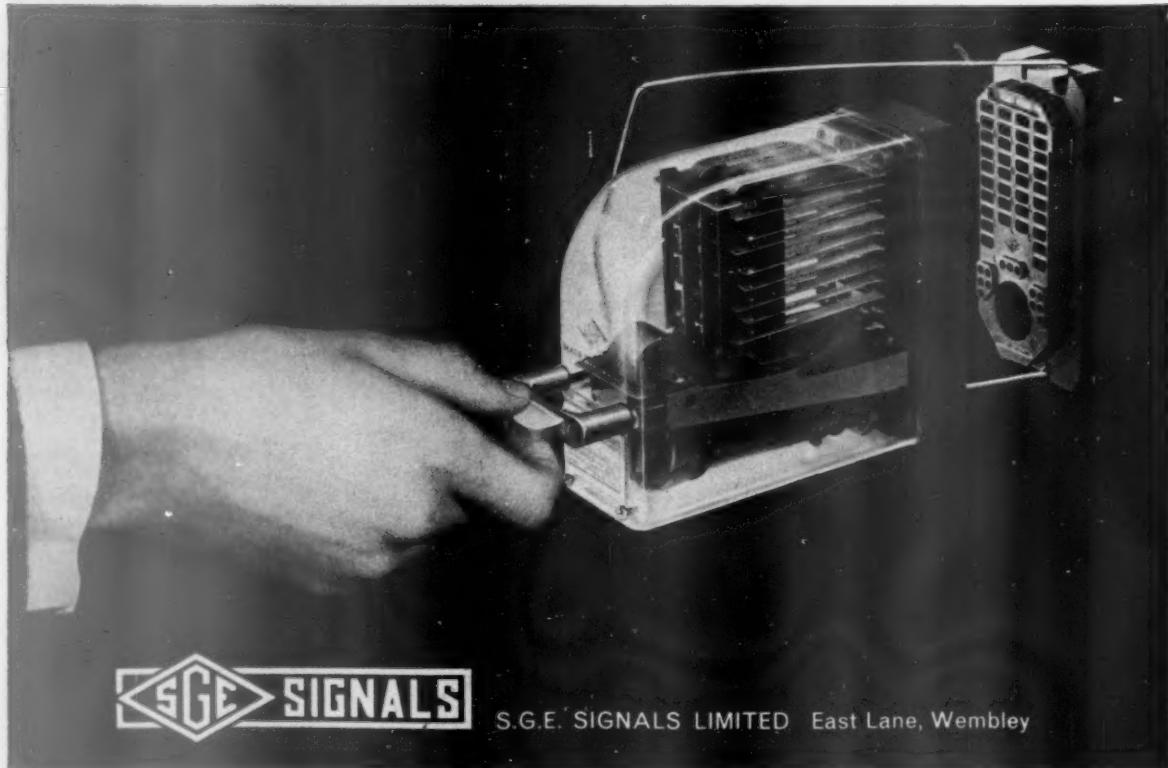


new developments in signalling by S.G.E.

miniature plug-in relays

TO AN ENTIRELY NEW SPECIFICATION

For many years S.G.E. has actively pursued the policy of reducing the size and cost of railway signalling equipment. Now a new range of miniature plug-in relays has been successfully developed and is already being widely adopted by British Railways and by overseas users. Each of these relays occupies only about a quarter of the space required for the former standard size and the weight is reduced in the same proportion. The cost of relay rooms and location cases will thus be greatly reduced and the increased number of contacts available on these relays and the lower initial cost will further cut down the expense of modern relay interlocking control systems. Miniaturisation is but one aspect of a large scale research and development programme being carried out by S.G.E. which will make many important contributions to the modernisation of railway Signalling. Today S.G.E. can meet all railway signalling needs and will be ready tomorrow with new, better, quicker and safer apparatus and techniques to take care of the future.



S.G.E. SIGNALS LIMITED, East Lane, Wembley

Write for publication R.S.70, for further information



portable welding equipment

for continuous jointing
of long welded rails

Developed for use with the system originated by British Railways, this lightweight plant comprises a welding generator, a profile grinding machine and a vertical milling machine. It can therefore carry out the entire process of welding in situ, dressing, profile grinding and milling in an average time of 30 minutes per pair of rail joints for two operators.

The welding generator, driven by a governed 25 h.p. air-cooled engine, provides 300A continuous, with a maximum of 400A. Engines can be supplied for running on petrol or propane gas. The auxiliary generator gives 27.3A at 110V d.c. for operating auxiliary equipment. The complete assembly is mounted in a wheeled tubular frame with all controls, the total weight being about 965 lb. A pair of tubular detachable handles is provided for manoeuvring the unit on the site.

After the weld is made, excess metal is removed by a portable Flextol flexible shaft grinder. The Flextol Profile Grinder attachment is then clamped to the rail, and its flexible grinding belt gives a contour accurate within 0.005". The Vertical Milling Attachment then removes from the base of the rail the steel strip used to retain the weld metal.

Whilst primarily intended for jointing rails, the welding plant is equally suitable for other welding work where a high output is required from portable equipment.



Full particulars from

FLEXTOL ENGINEERING COMPANY LTD

THE GREEN • EALING • LONDON • W5

Telephone: EALING 6444/7 Telegrams: DOMINATING, EALUX, LONDON



DOUBLE-ACTING DROP HAMMERS

for high speed production
of accurate forgings

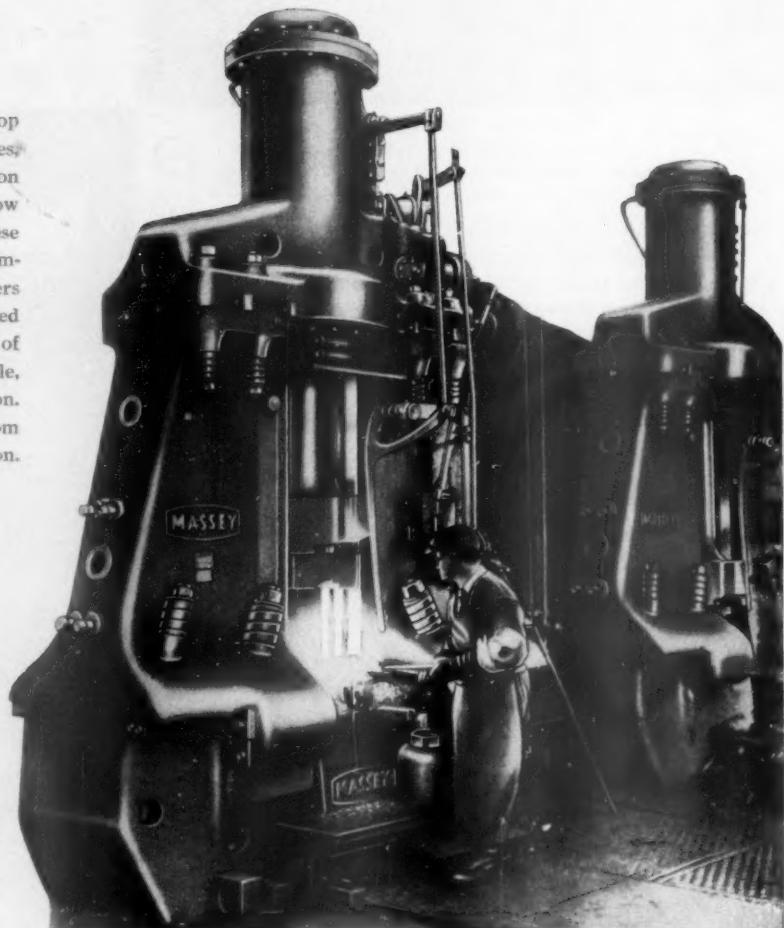
Massey Double-Acting Drop Hammers are made in two ranges, the 'Ram' type and the 'Piston Rod' type. Due to the high blow velocity achieved by these machines, the blow energy as compared with gravity drop hammers is much higher, which coupled with the increased number of blows per minute available, ensures far greater production.

Available in sizes from 10 cwt. to 8 ton.

20 cwt. 'Ram' type
Double-Acting Drop Hammers.
Messrs. Austin Motor Co. Ltd.



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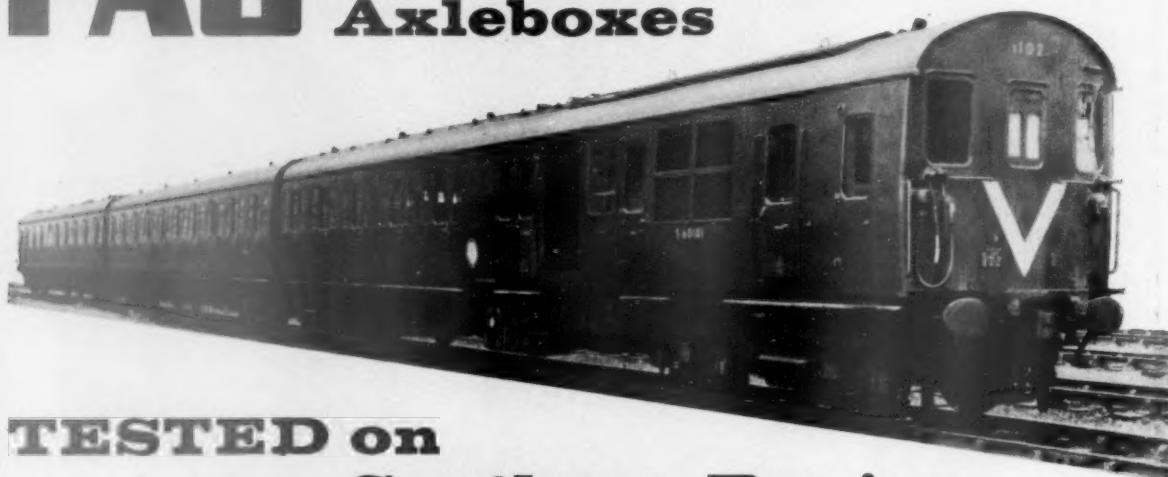


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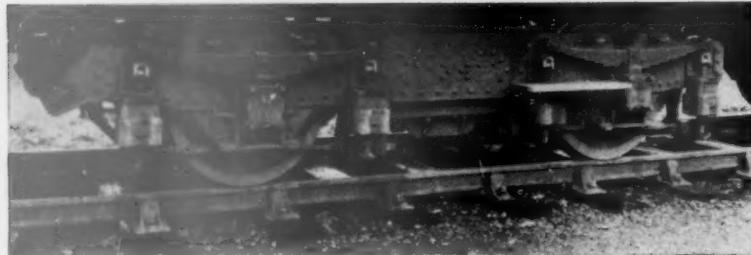
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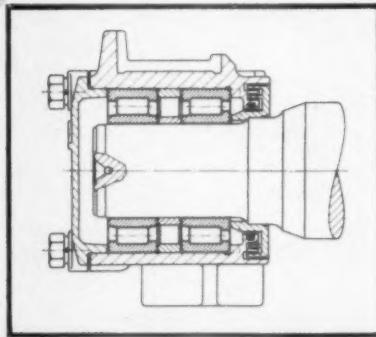
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ABOVE: The diesel-electric unit fitted with FAG cylindrical roller axleboxes on Motor Coach and Driving Trailer.

LEFT: Close-up of one of the bogies after completion of 85,000 miles, at speeds of up to 75 m.p.h.

BETWEEN: The robustness and simplicity of the new design are readily appreciated from this cross-section

Photographs: Courtesy of British Railways, Southern Region



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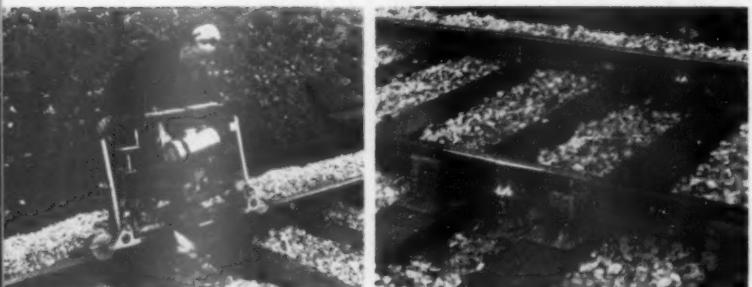
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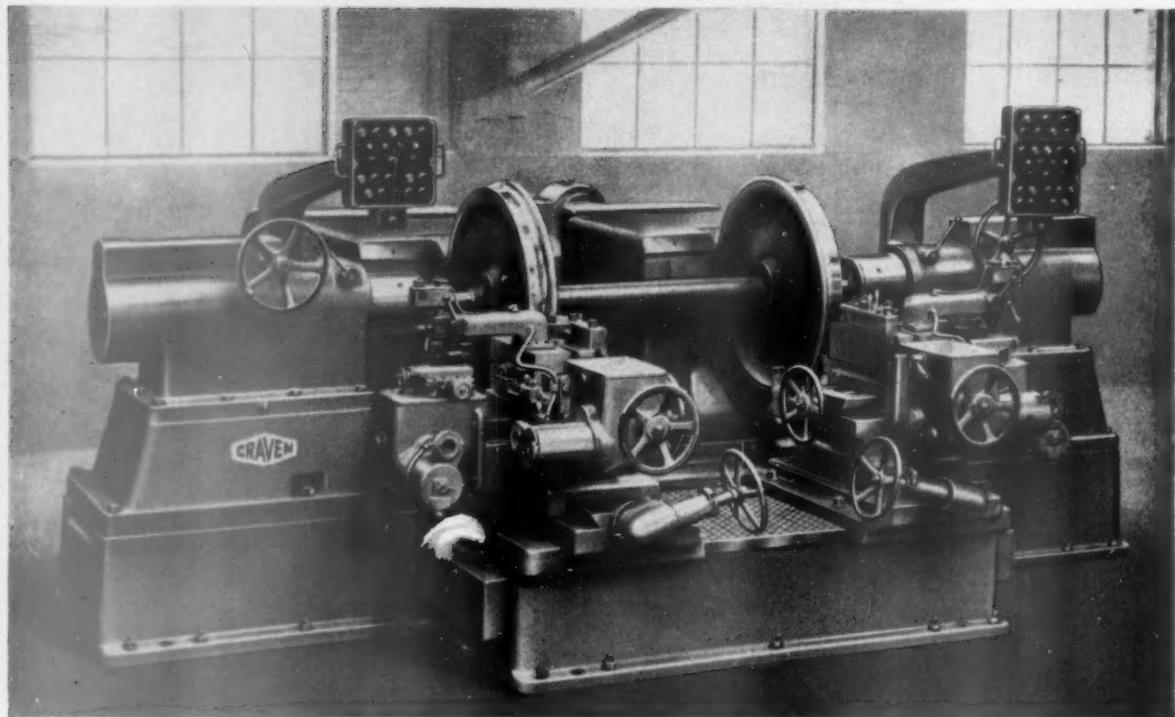
Economical, too. The Thermit Welding "Quick" process can be carried out by local labour under trained supervision and the equipment is easily transported.

These illustrations show 95 lb. B H rail being joined by the "Quick" process on British Railways—Western Region. The process can be used for any rails normally used in railway tracks.

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Patent Nos. 849291 & 833326.

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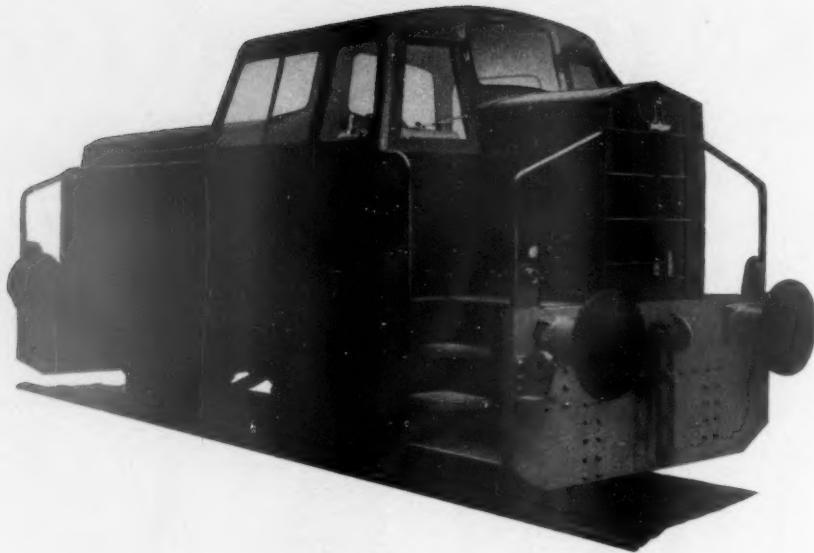
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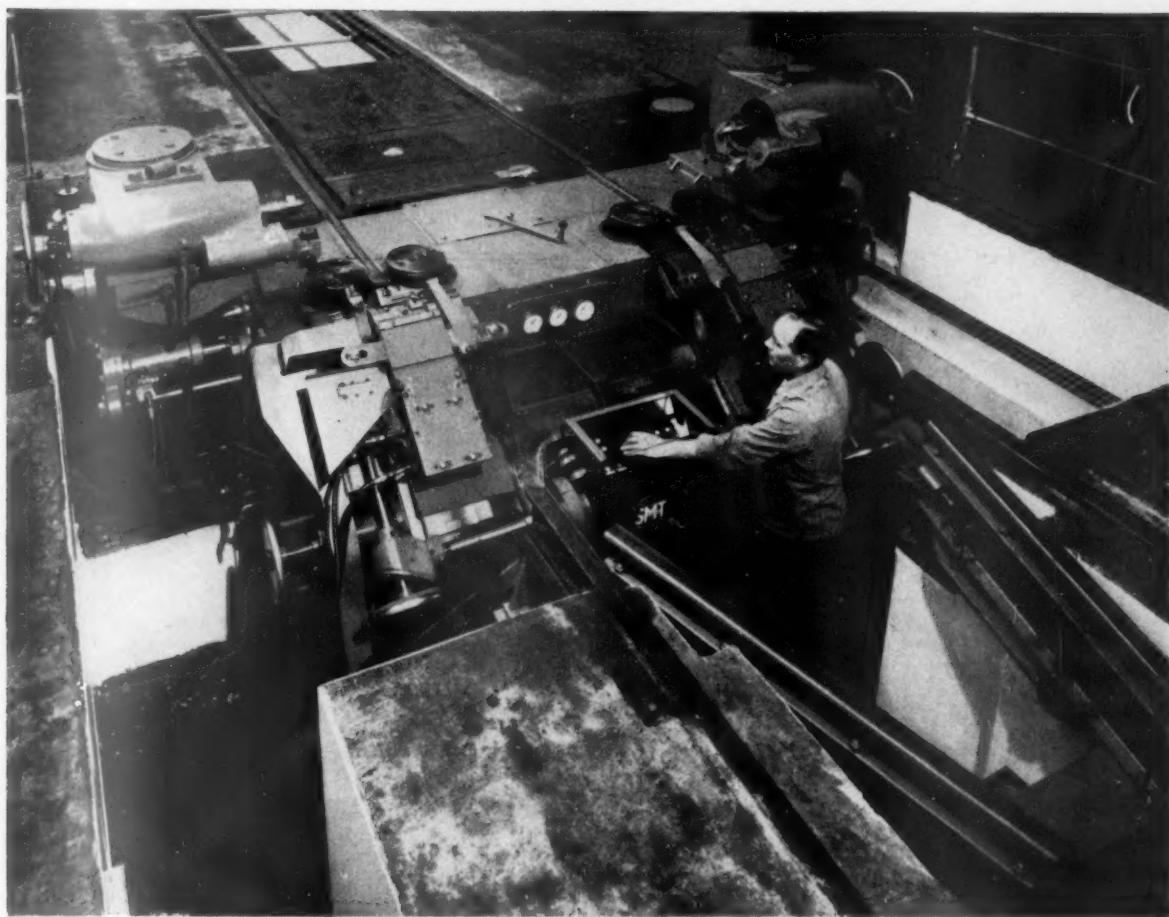
This equipment, together with various other types of railway vehicle braking apparatus used extensively on the continent and developed by Knorr-Bremse of Munich over the last half century, is now manufactured and offered by



View of cab interior showing dual driver controls.



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UNDERFLOOR WHEEL LATHES

We have to thank the Chief Mechanical Engineer (Railways), London Transport Executive, for permission to publish the above photograph of the Underfloor Wheel Lathe of our manufacture installed at the Piccadilly line depot at Northfields. This machine has been in production for a considerable period, and is enabling very useful economies to be made in maintenance time and costs.

In recent years the problem of bogie maintenance has been considerably modified by the adoption of improved designs of axle boxes, suspension and brake equipment. It is now only necessary to dismantle bogies at long intervals on account of these items, but tyre

turning is still a frequent necessity, so great economies are possible if the tyres can be returned without removal of the wheel-set from the vehicle. This machine enables this to be done, and the heavy dismantling and re-assembly associated with the removal of the wheel-set from the vehicle can be eliminated.

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These machines incorporate a number of patented features, and others which are the subject of patent applications.

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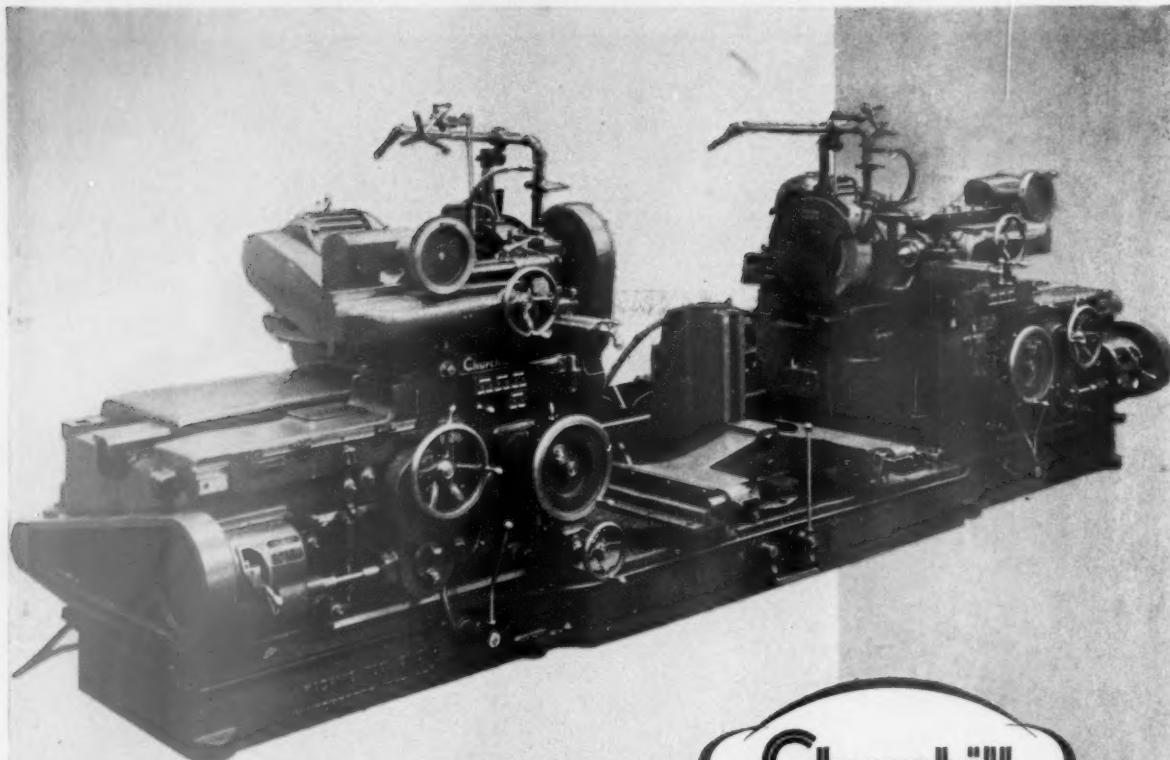
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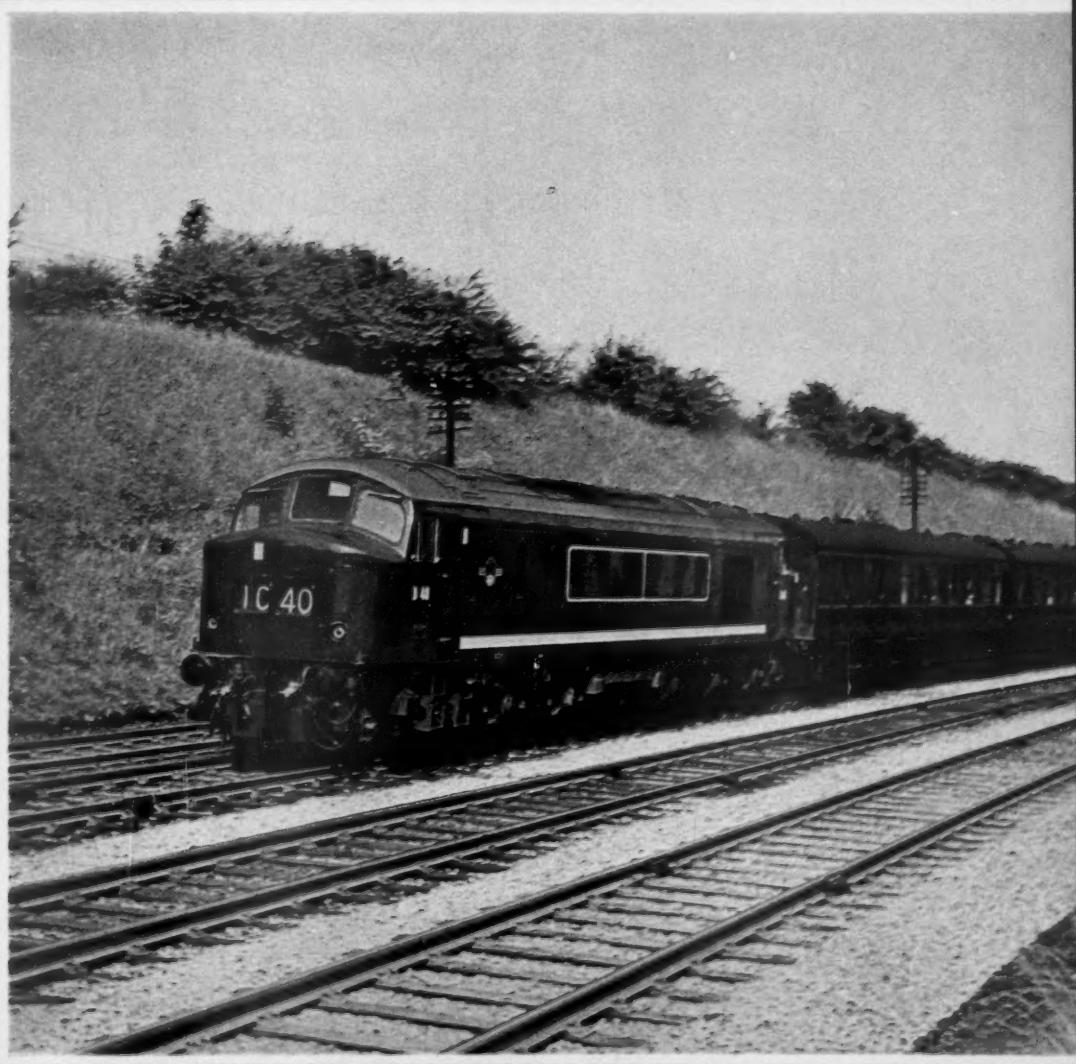
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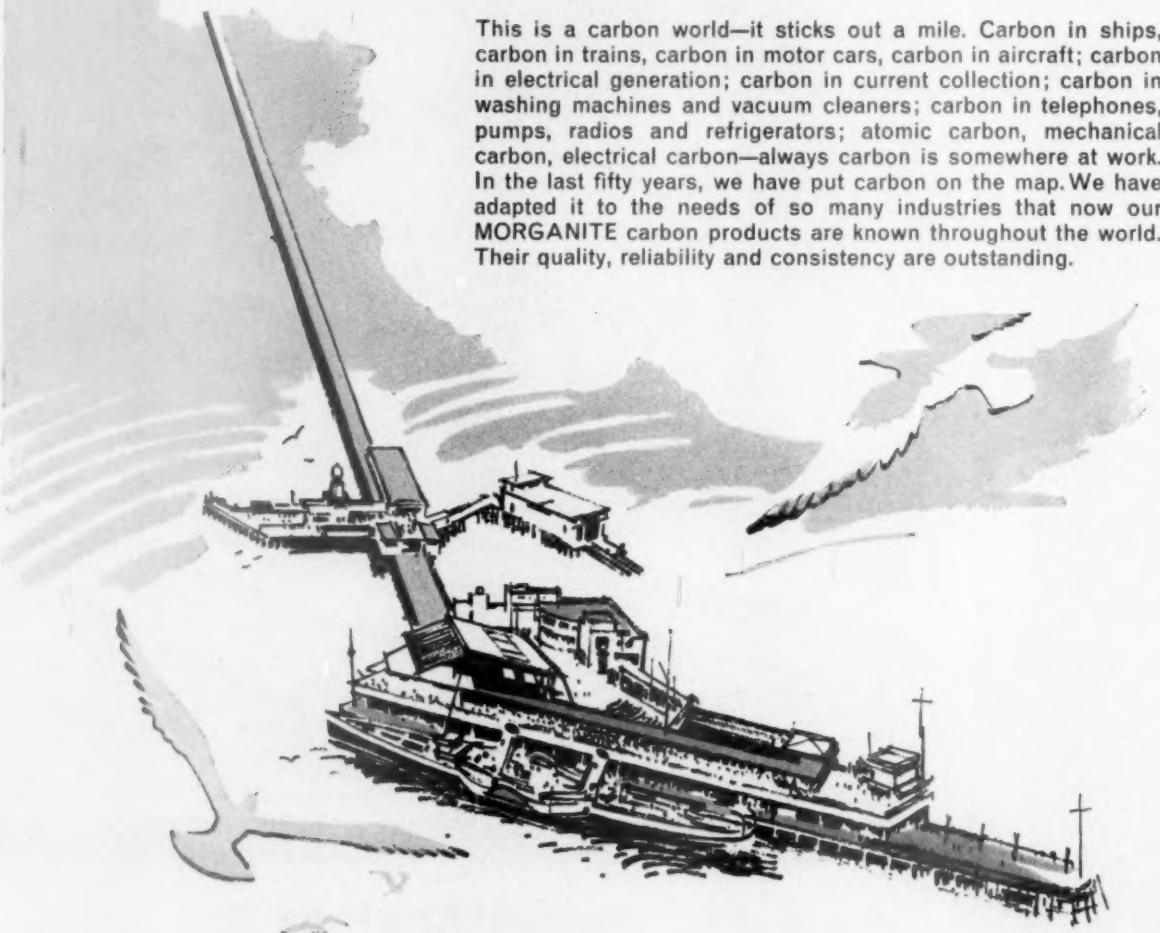
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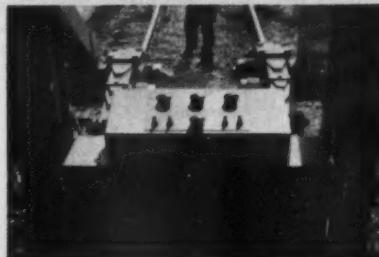
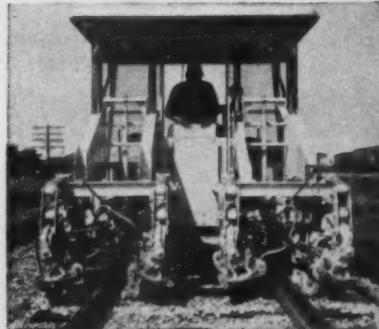
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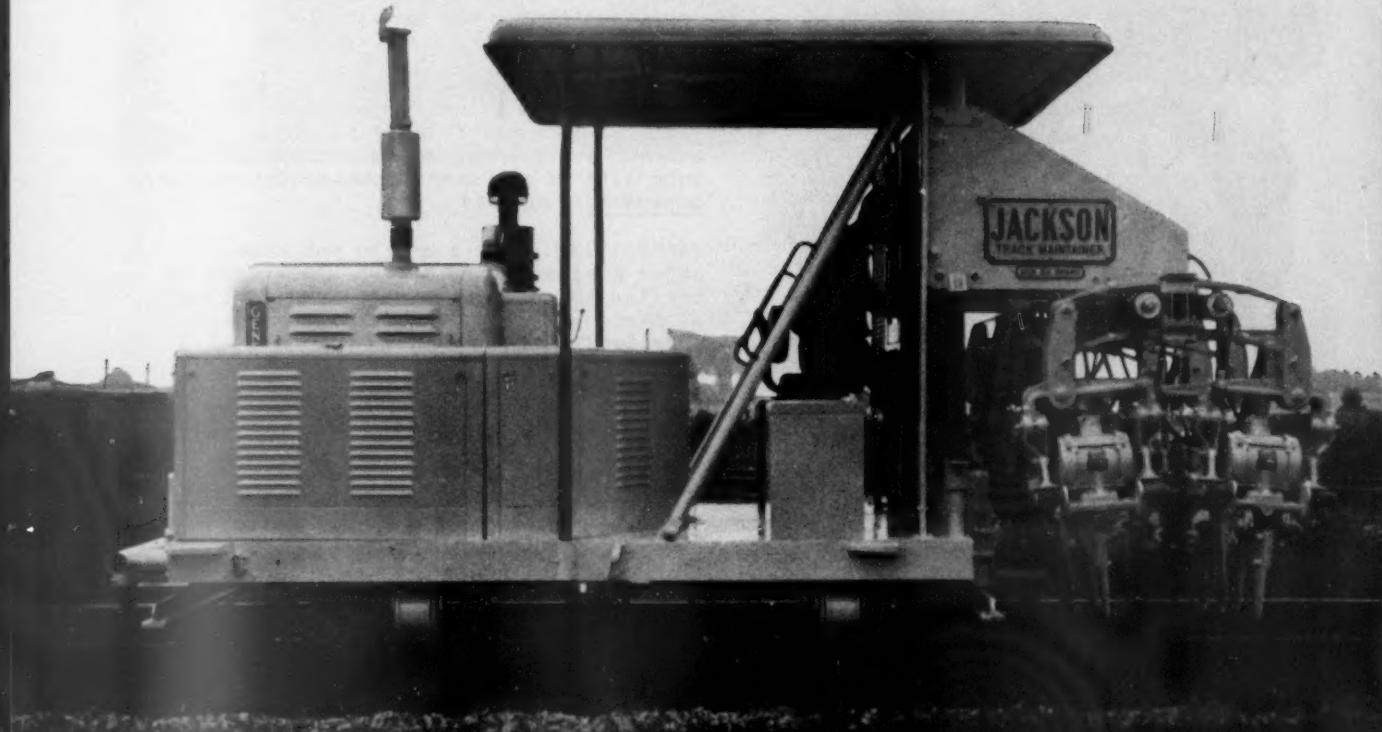


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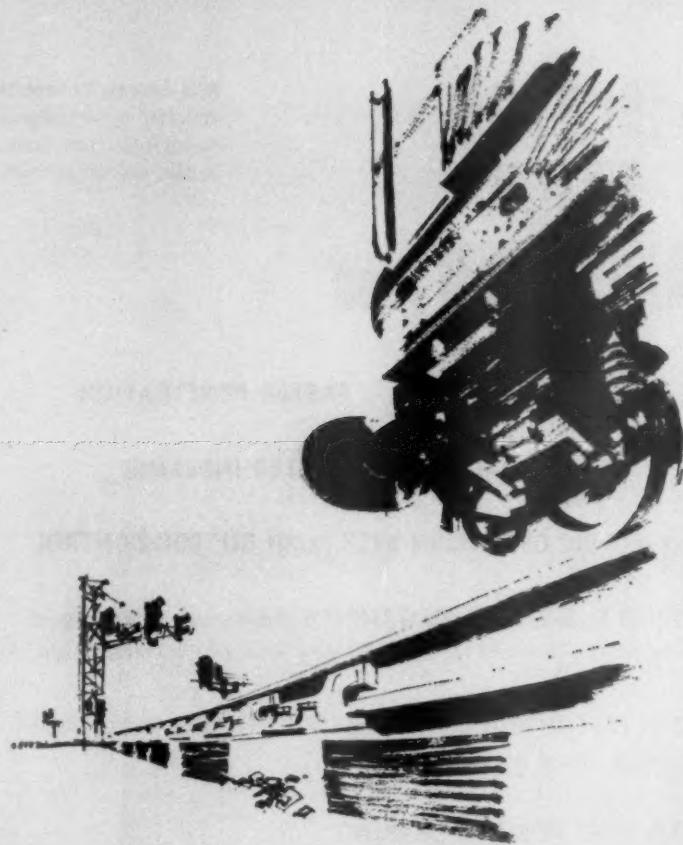
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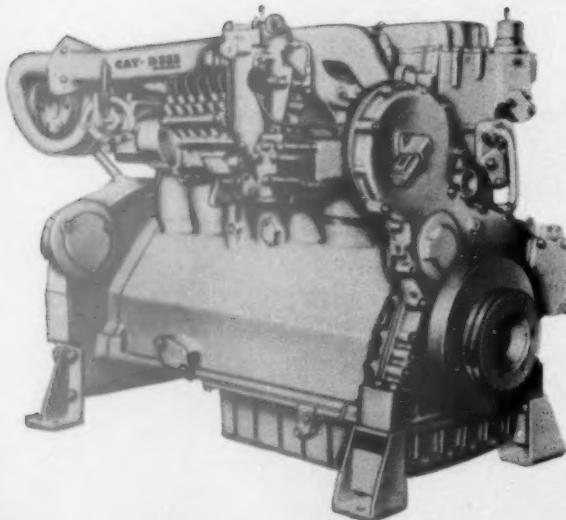
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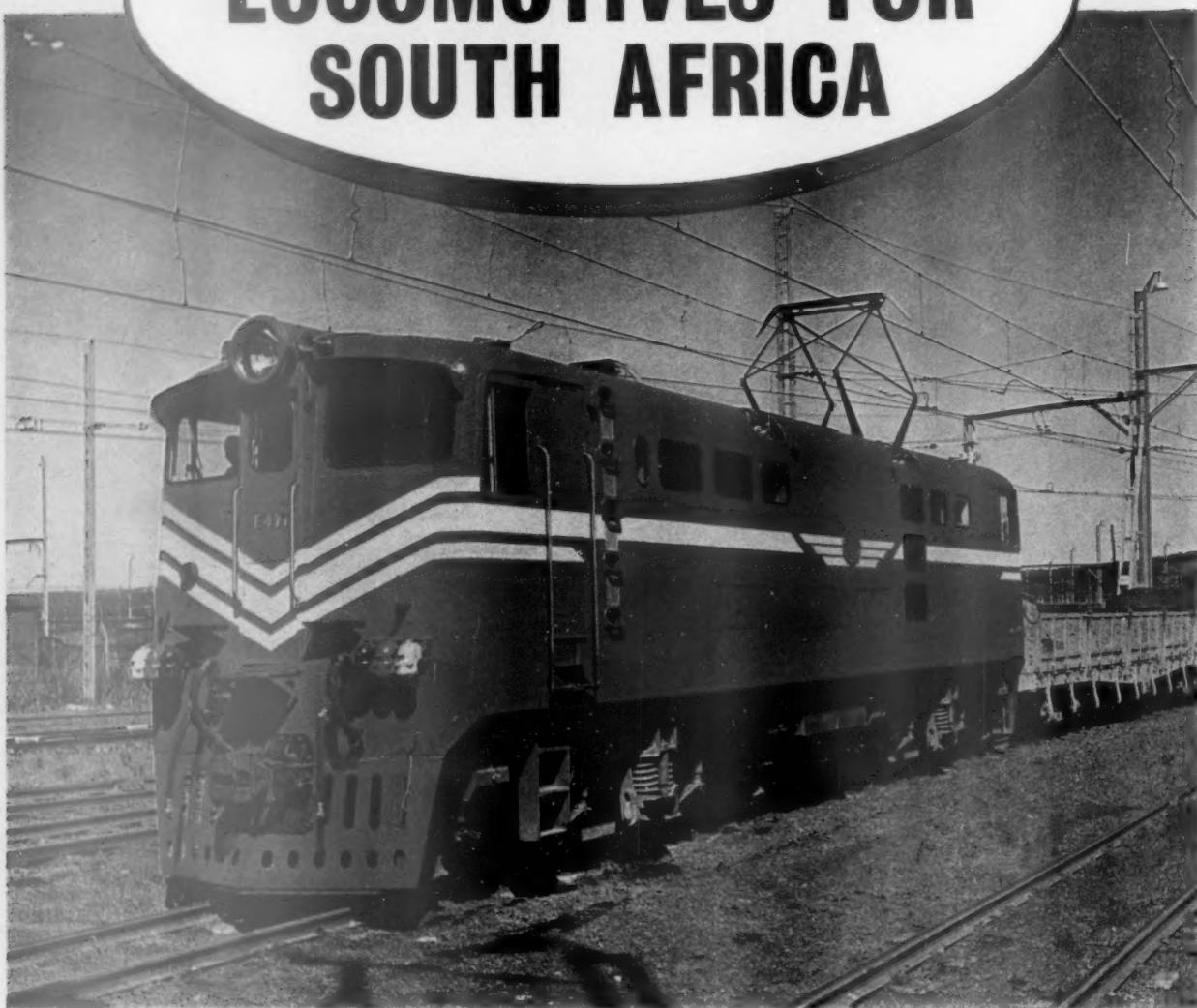
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An international journal of management, engineering and operation

VOL 115

FRIDAY DECEMBER 1 1961

No. 22

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Editor: B. W. C. Cooke, Assoc. Inst. T.

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BRISTOL: 20, Victoria Square, Clifton

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Co-ordinating chaos

It is clear that as the Transport Bill stands at present the talk of co-ordination of transport must in effect make nonsense to serious students of a national system. The break-up of the various divisions of the British Transport Commission, which was envisaged in the White Paper as Government policy, is now, according to the Bill, to be implemented by legislation. It is true that one glimpse of sanity is embodied in that measure. The hotels and catering side is to remain with British Railways. To the impartial practical observer it is difficult to see how any other decision could have been taken. On the other hand, the other divisions of the Commission are to be run as separate entities under the Holding Company. Suggestions that the

docks and waterways, road freight traffic, and so on will not become competitors of the railways, and subject to their own forms of Parkinson's Law are hardly likely to be realised. Vague hopes that there will be continued liaison between the chiefs of these bodies and the Railways Board disregard human ambition and, indeed, the obligation which will rest on these bodies to promote their own well-being. The lack of a directly co-ordinating body will be felt very soon after the passage of the present Bill, even if it is not in evidence before. The Bill, in effect, puts back the clock to well before the days of the old "Square Deal" and in many ways is a reversion in British transport to jungle warfare. It does far more than pay lip service to the ideals of free enterprise which are the keynote of the present Government political belief. The former railway companies and many of the major road transport groups of this country were confirmed believers in free enterprise, but they also had a very common-sense attitude toward the benefits of mutual co-operation. It is not in accord with present ideas of the working of free enterprise in industrial undertakings that there should be no diversification of interest or that various branches of a common industry from a national viewpoint should not be operated in co-operation. The giants in the chemical industry, for example, do not confine their activities to the production of any particular chemical.

British Railways orders more equipment

THE British Transport Commission has ordered a further 27 complete main-line diesel locomotives from the Brush Electrical Engineering Co. Ltd. and further sets of diesel engines and transmissions from Associated Electrical Industries Limited for 57 locomotives to be assembled in railway workshops. Thirty-four of the locomotives will be based in Yorkshire for Eastern and North Eastern Region services in the Hull, Leeds, and Sheffield areas. The remainder are for main-line services in the London Midland Region. The value of these orders is nearly £5 million. The 27 complete locomotives, with 1,365-h.p. diesel engines ordered from Brush Electrical Engineering Co. Ltd., are a further instalment for the Eastern Region scheme to eliminate steam traction in the Sheffield area. Under this scheme, 500 steam locomotives are to be replaced by approximately 215 diesel locomotives. The 57 locomotives to be assembled in the railway workshops at Darlington and Derby are of 1,250 h.p., seven will be allocated to the Hull and Leeds area and 50 to the London Midland Region for use on lines to the south of Leicester, all as steam replacements. All the locomotives are of mixed-traffic type with electric transmission.

U.K.R.A.S. entertains Chilean railway delegation

ON MONDAY, November 27, the United Kingdom Railway Advisory Service (U.K.R.A.S.) entertained a three-man delegation from the Chilean State Railways to dinner in the Charing Cross Hotel. The delegation comprised Senor F. Creuchaga, formerly General Manager and a Director of the Chilean State Railways and now retired; Senor F. Palma, Chief Electrical Engineer, and Senor S. Prett, Chief Mechanical

Engineer (both of the Chilean State Railways). Señor Creuchaga who, when General Manager of the Chilean Railways signed a contract in Italy for the first stage of the modernisation of his system, is acting as adviser to Señor Palma and Señor Prett in what is understood to be primarily a fact-finding tour. While in England, the delegation has visited examples of new work on British Railways, with special reference to electrification, an aspect of modernisation in which the Chilean system has particular interest.

U.I.C. information services

In last week's issue we gave details of an important development in the information services provided by the International Union of Railways. This is designed to meet the increasing desire by railway administrations for information from the General Secretariat of the U.I.C. arising from both European member networks and also from railways outside Europe. Because of its very wide connections with railway studies, the U.I.C. is in a peculiarly advantageous position to assist railways all over the world in the supply of information, and the new "forum" which is being established will greatly assist to promote not only the prestige of railways but also to give them practical and valuable information which should assist them towards greater efficiency and commercial viability. It is obviously in the interests of railways wherever they may be to co-operate in a worthwhile project of this kind, which has as its basis the mutual advantage of all concerned. The U.I.C. is to be congratulated on the initiative it is showing in this matter.

Road haulage rates increase

THE Rates Committee of the Road Haulage Association has recommended to its 17,000 members, who operate over 100,000 vehicles, an increase of 7½ per cent in rates from January 1, 1962. For certain special traffics an increase of more than 7½ per cent is considered justifiable. The last increase in rates was in November, 1960, and since then many of the costs which have to be met by hauliers have gone up or are about to go up, in some cases substantially. Vehicle excise duty was increased by 20 per cent and the tax on lubricating oil was increased by 2d. a gallon in the Budget in April last. An extra 3d. a gallon was put on the fuel tax in the "Little Budget" in July. In addition to all this a statutory increase in wages comes into force for the industry in January next. Other factors which have influenced the Rates Committee in reaching its decision include vehicle insurance, the cost of which has risen by between 20 and 30 per cent, the Government's graduated pension scheme, rising costs of maintaining vehicles, and telephone costs.

Dearer coal?

THE Chairman of the National Coal Board, Lord Robens, recently announced proposals to increase the price of industrial coal by 10s. a ton in Scotland and 6s. a ton in the North West from January 1, 1962. In addition, an increase of 10s. a ton on large coal in all areas is proposed. This means that in Scotland and the North West this grade of coal will cost 20s. and 16s. more respectively. The Industrial Coal Consumers' Council is to consider the proposals in a fortnight's time. The railways have taken 7 million tons of large coal for steam engines this year and, though consumption is dropping rapidly as diesel engines replace steam, this latest increase will undoubtedly mean increased running costs to British Railways. This follows closely the announcement of the recommendation to its members by the Road Haulage Association of an increase in rates, partly because of higher fuel costs. It is a matter of conjecture whether a similar announcement by British Railways of higher rates and fares would be received with the same apparent equanimity.

Derailment between Laïndon and Pitsea

THE derailment of a passenger train between Laïndon and Pitsea last April was due to one inexplicable cause. Single-line working was in force, so that the train, running in the Down direction, was travelling along the Up line. It was travelling downhill, and one of the catch-points along the line had been erroneously clipped in the open or derailing position. The handsignaller concerned did not try to excuse his mistake, and Colonel J. R. H. Robertson, whose report is summarised on a later page, found him solely to blame for the derailment. It was clearly a case of human error, for which Colonel Robertson could find no explanation. It was also established that the train was travelling at well in excess of the 10 m.p.h. speed limit laid down in such circumstances. Here the engine crew were to blame for the extent of the damage, and one is bound to add that there have been other recent cases of excessive speed. The train consisted of coaches with wood-frame and all-wood bodies, and this again intensified the severity of the damage. Here is a case where we are still paying for the delay in rehabilitation forced on our railways during the years immediately succeeding the war.

Glasgow's Blue trains

THE Scottish Region of British Railways and the citizens of Glasgow take justifiable pride in their Blue trains which have now been running for eight weeks since their reintroduction in October. Those electric trains, which run between Airdrie and Helensburgh passing through Glasgow, are carrying five passengers for every two carried by the steam trains which previously ran on the same line. Mr. G. L. Nicholson, Traffic Manager of the Glasgow & South-West division, Scottish Region, said last week that the average week's revenue from these trains was now between £17,000 and £18,000, compared with about £7,000 earned by the steam trains. One of the most encouraging trends was off-peak travel which had doubled and reached 55,000 passengers on Saturdays. Punctuality was up to 92 per cent and, if one included trains which were not more than five minutes late, stood at 98 per cent. During a recent severe fog, buses and taxis ceased running, but the electric train services, assisted by the automatic warning system and colour-light signalling, continued running.

Refurbishing railway sleepers

THE Baltimore & Ohio Railroad has established a treating plant for the reclaiming of disused sleepers. It has estimated that the installation of centralised traffic control and the closure of uneconomic lines will eliminate some 2,000 miles of its total track mileage of 10,378. This will enable it to salvage approximately 7 million sleepers of varying age and condition during the next ten years. After their removal, the sleepers are inspected and those unfit for reclamation are disposed of locally. The remaining sleepers are sent to the reclaiming plant, where they are inspected again. Untreated plugs are driven into old spike holes and an electronic sensing device detects broken spikes which are driven in below the level to which the sleeper will be trimmed. The sleepers are then cleaned with water sprays and planed down. A three-hour treatment with a creosote-coal tar solution finishes the process. The number of reclaimable sleepers in disused tracks is 60 to 65 per cent and the charge for a treated sleeper is \$1.25 against \$4.22 for a new one.

American railway merger

THE Pennsylvania Railroad Company and the New York Central Railroad have announced an agreement to move as rapidly as possible toward a merger. This will be one of the most important merger moves in the recent history of the U.S.

transport industry. The railways stated that a joint application for approval would be filed with the Inter-State Commerce Commission as soon as a satisfactory basis for the merger had been agreed. The basic reason behind the merger appears to be the demands made on rail earnings by steadily rising costs and by the inroads made into their revenues by competing forms of transport. An announcement released by the companies concerned states: "The need to reduce costs and increase efficiency through eliminating the duplicating of facilities and services is far greater now than in 1957 when the studies were begun." These studies were in connection with a previous plan to merge the railways which ended in failure in January, 1959. If the merger goes through it will create an enormous railway network whose revenues will amount to more than \$1,500 million annually.

Resurrection of the Polish Railways

SINCE the end of the war, the Polish railway system has repaired or renewed over 10,000 km. of track, more than 60 km. of railway bridges, nearly three-quarters of all signalling and telecommunications installations, and thousands of locomotives and wagons. Apart from war damage repairs, a good deal of development work has been undertaken. Over 1,000 km. of line have been double-tracked and some 850 km. of line electrified. Net freight ton-kilometres per annum is more than 2½ times the prewar figure. This is partly because of the great increase in international traffic between the countries of the Eastern bloc, especially between Soviet Russia and East Germany, which by-passes Warsaw via the new 160-km. connection between Skieriewice and Lukow. Passenger traffic has quadrupled, and passenger kilometres has risen to five times the prewar figure. As the result of the current electrification programme, some 30 per cent of all traffic will be hauled electrically by 1966. Other modernisation measures include a large-scale introduction of diesel traction and of automation.

Mushroom transhipment and marshalling yard

BEFORE the construction of the Mokameh Ganges Bridge on the North Eastern Railway of India there was, not far from what is now its northern end, a little hamlet, Garhara. This is now the scene of the largest transhipment yard in India. As recently as April, 1959, only 118 wagons of both 5 ft. 6 in. and metre gauges were transhipped there daily. Two years later the number had risen to about 430, about 230 of them being of broad gauge that had come over the bridge from West Bengal and South Bihar. Their contents were loaded into metre-gauge stock and despatched to Northern Bihar, North Bengal, and Assam. The other 200 were arriving metre-gauge wagons, their loads transferred to broad-gauge stock proceeding southward. Garhara is also a marshalling yard dealing with an average of 1,000 wagons daily received in eight and despatched in nine trains. A speciality in transhipment is the provision of a large Goliath crane for the transfer of heavy steelwork. It has handled much material for the construction of the Brahmaputra Bridge and other important works.

Electric turntables in India

HITHERTO, the only electrically-worked turntable on Indian Railways has been at Delhi, but a second one was installed on July 7 at Tiruchirapalli (formerly Trichinopoly) on the Southern Railway. This is a mixed 5-ft. 6-in. and metre-gauge turntable. This table has a number of improvements as compared with the one at Delhi, including a rotary switch with contactor operation instead of a triple-pole double-throw switch for reversing the direction of rotation, and a rotary selector switch in the indication circuit for track alignment, together with a bell indication for calling the attention of the operator. Other improvements are a specially-designed hook for eliminating the twist in cables, and an additional countershaft and gearing

for mechanically reversing the direction of driving the electric motor. Both turntables are products of railway workshops.

Public reaction to Transport Bill

PROBABLY the most significant aspect of public reaction to the Transport Bill has been an almost total lack of editorial comment in the national newspapers. Although *The Times*, *The Daily Telegraph*, *The Guardian* and, to a lesser extent, *The Financial Times*, gave full coverage to last week's debate, of these newspapers only *The Financial Times* and *The Daily Telegraph* accompanied their reports with editorial comment. Non-committal in tone and full of questions unanswerable at the moment, *The Financial Times*' editorial was an interesting exposition of the puzzled anxiety which is representative of a substantial body of public opinion. Phrases like: "There can be little doubt that the new structure for public transport is the best we have had since the war, and that, broadly speaking, the Government has laid down the right priorities" are followed by such comments as: "And yet Mr. Marples would be the last to claim that the new Transport Bill in any way solves the transport problem, which is if anything getting worse." Quite a lot of space was given to the observation that the exact size, shape, and nature of the ideal transport system for these islands is unknown and to questions concerning the degree to which British Railways should continue to be subsidised, their future under the Common Market situation, and the effect of the Channel tunnel (or bridge). To none of these queries are answers attempted. Yet the article in no sense is uninformed or glibly produced: rather does it suggest that the situation has been carefully weighed up and found so seriously wanting as to call for a "wait-and-see" policy. This may be an attitude permissible for interests not specifically devoted to transport matters—though in such matters everyone is affected—but it cannot hold equal validity for those more closely in touch with the transport scene.

The Daily Telegraph took advantage of the general atmosphere of ambiguity to perpetrate 15 inches of chat on the association of ideas which arose in its mind while listening to the debate and observing the House. In this account, little old railways, dirty British coasters with salt-caked smoke stacks, Dame Irene Ward's hat, and Mr. John Betjeman figured more or less prominently. One flight of fancy which might be held to have a surer relation to what is undoubtedly a serious situation, and one not suitable for the exercise of facetious wit, may more usefully be quoted in full. *The Daily Telegraph* wrote: "The atmosphere is that of a Victorian novel in which the family lawyer is reading the Will, no one quite able to cope with all the legal jargon, everybody wondering desperately what there is in it for him." Consciously or unconsciously, *The Daily Telegraph* may well have hit the nail on the head here.

Meeting of Ministers of Transport

THE Council of Ministers of Transport of the European Conference of Ministers of Transport met in France on November 21, under the Chairmanship of Mr. K. Waldbrunner, Austrian Minister of Transport.

The Ministers noted a report by their deputies on traffic development and transport investment in 1960: rail passenger traffic showed little change on average but goods traffic was up by 6.2 per cent over the previous year. The figures for inland waterways were even better, showing a rise of 17.7 per cent overall and 28 per cent for Rhine traffic. In 1960 the number of road vehicles was 13 per cent higher than in 1959. In dealing with the section on investment, the Ministers, as in previous years, reviewed the financial efforts to improve transport equipment and noted the importance of transport and its development in the general economy.

The financial situation of the railways was again discussed and the measures taken in 1957 were confirmed and expanded. The question was maintained on the Council agenda and will be taken up again later in the light of the conclusions reached on the general transport policy now being drawn up.

Another resolution adopted concerned the standardisation of railway rolling stock; progress made in recent years was regarded as generally satisfactory, particularly for the "Europ" wagon pool. To increase the proportion of vehicles of standard types, the railways were invited to extend standardisation to cover special types of wagons, so that these could be incorporated in the "Europ" pool with wagons of traditional types.

Equipping railway wagons with automatic coupling so as to lighten the work of shunters was also discussed. On the technical side, negotiations are proceeding between East and West with a view to selecting types of coupling which could be used together. On the financial side, an estimate of the investment required and the saving expected is being drawn up.

The Council of Ministers heard the reports of the three groups operating within the framework of the Conference.

The first, under the Chairmanship of Mr. Buron, French Minister of Transport, gave an account of the work of the Eurofima Company, which was set up by the E.C.M.T. in 1955 for the international financing of railway rolling stock.

The second, under the Chairmanship of Mr. H. C. Seehoem, German Minister of Transport, informed the Council of the work done in the field of transport by the six countries of the European Economic Community.

The third, under the Chairmanship of Mr. Bertrand, Belgian Minister of Transport, was concerned with the standardisation of road traffic regulations (preparation of a European Highway Code).

The Council re-elected its officers as follows. Mr. Bratteli, Minister of Transport of Norway, was elected Chairman, and Mr. Bertrand and Mr. Buron, Ministers of Transport of Belgium and France, first and second Vice-Chairmen.

Winter train services in Europe

THERE are various changes of note in the winter train services on the mainland of Europe, additional to the French winter service alterations described in our September 22 issue. In Germany the "Komet" sleeping car train, originally an articulated set of first class sleeping car and reclining chair stock, which worked between Hamburg and Zurich, has become a train of considerable importance. It now conveys first and second class sleeping cars, first class coaches and second class couchettes from Hamburg at 8.44 p.m. to Basle, a first and second class sleeping car from Stockholm to Milan (suspended from October 28 but reinstated from December 16 and then diverted to Chur, for the benefit of winter sport travellers to the Engadine), new Swiss Federal second class couchette coaches from Copenhagen to Chur and from Hamburg to Geneva, and a first class sleeping car from Grossenbrode to Chur. This means, in effect, that the "Komet" is being amalgamated with the "Schweiz Express," which hitherto has run in the summer months only.

There are various additional sleeping car facilities. The "Orient Express" (9.15 p.m. from Paris Est) now provides second class "tourist" berths in the Paris-Vienna sleeping car, and the Paris-Stuttgart car is of the "special" stainless steel type with small single compartments. During the winter sport season from December 22 to March 16, the "Holland-Italy Express" (8.7 p.m. from Amsterdam) will include a through sleeping car for Interlaken, and on Fridays only during the same period, the "Austria Express" (7.20 p.m. from the Hook of Holland) will have a through sleeping car for Lindau and Innsbrück, returning on Saturday nights. Also during the winter sport season the 8.16 p.m. from Ostend Quay, now in connection with the 10 a.m. service from Victoria, will include a sleeping car for Chur, and second class couchettes

through to Innsbrück. Train CB (8 p.m. from Calais Maritime instead of the former 6.42 p.m.), in connection with this winter's later departure from Victoria at 3.30 p.m. (1 hr. earlier from October 29), and now accelerated to reach Basle only 54 min. later, at 6.9 a.m., is to have its restaurant car restored between Calais and Metz during the winter sport season, between December 15 and March 25.

Some of the most interesting European changes are those which have been introduced in Russia. Although the principal trains between Moscow and Leningrad, including the "soft class" "Red Star" sleeping car train, have all operated during the night, with a journey time of 9 hr. or a little over for the 404 miles, for some time past there has been a fast diesel-hauled day express taking no more than 6½ hr. This service has now been doubled, leaving Moscow at 7 a.m. and 3.40 p.m., and Leningrad at 3.55 p.m., and the journey time has been reduced to 6 hr. 20 min., requiring an average speed of 63.8 m.p.h., including the intermediate stop at Bologoe.

There has been a considerable acceleration of the service between Moscow and Brest-Litovsk, and of its international connections. The previous 1.20 p.m. from Moscow, conveying the through sleeping cars for the Hook of Holland and Paris, now starts at 3.25 p.m. but reaches Brest 10 min. earlier, at 7.10 a.m., an acceleration of 2 hr. 25 min. In the reverse direction, the train with the through sleeping cars leaves Brest-Litovsk 5 min. earlier, at 2.50 a.m., and is into Moscow at 7.10 p.m., 90 min. earlier. The 6.25 p.m. "Chopin," introduced last summer as a through train to Warsaw and Vienna and with a through sleeping car running variously to Prague, Vienna or Rome, according to the particular night of the week, is being continued, but starting from Moscow at 6.40 p.m.; it reaches Brest-Litovsk 40 min. earlier, at 12.20 a.m.; in the opposite direction the Moscow arrival is 55 min. earlier, at 3.5 p.m.

The timetable would also appear to indicate that some fast running is now being performed on the main line from Moscow to Kharkov and the south-east. It shows an express as leaving Moscow at 12.10 p.m. and covering the 333 miles to Kursk, with intermediate stops at Tula and Orel, in 5½ hr., and six others in between 5 hr. 25 min. and 6 hr. 15 min.; in the reverse direction the times are not so fast, though one express appears to take 5 hr. 13 min. only on the run; hitherto, 7 to 7½ hr. has been the fastest time over this route. The best time over the 484 miles between Moscow and Kharkov is now just over 9½ hr. each way.

In various other directions from Moscow there have been cuts of 1 hr. or more in journey times. The night express for Kiev and Lvov, with through sleeping cars for Prague, Budapest and Belgrade, for example, now leaves Moscow 1½ hr. later, at 9.25 p.m., but is only 9 min. later into Lvov, and reaches the Czechoslovak frontier at 2.00 a.m. earlier, at 6 a.m., a total gain of 1 hr. 35 min. The Belgrade arrival is 2 hr. 50 min. earlier. In the northbound direction, the through coaches leave Belgrade 1 hr. 40 min. later, at 12.25 a.m., and the arrival in Moscow, after two nights in the train, is 1 hr. earlier, at 7.37 a.m. These are very substantial improvements.

Argentine railway crisis

THE uneasy truce between railwaymen's unions and the Argentine Government was broken in late October when the unions ordered their representatives to leave the joint committee which had been set up to work out solutions for the manifold problems on hand, and at the same time decreed three nation-wide 48-hour strikes in order to force the Government to grant an immediate minimum salary increase of 2,000 pesos per month. The first of these strikes took place without incident on October 26 and 27. In view of the situation thus created, the authorities closed down most of the railway workshops, a number of secondary branches, and all refreshment services, at the same time cancelling all dining car services until such time as private operators could take them over. They

announced that the rationalisation programme would be proceeded with at once in view of the attitude taken by the unions.

The reply of the men was to declare another strike as from October 30 for an indefinite period. Support was requested from the General Confederation of Labour (C.G.T.), which declared a three-day general strike for November 7, 8 and 9. The Government issued a statement to the effect that the men's action had been taken without following the procedure laid down by law regarding strikes, and constituted a grave abuse of the right to strike. They further stated that they intended to introduce emergency services at the earliest possible moment, and to this end key men would be compelled to present themselves at their posts, although a general mobilisation would not be resorted to. Railwaymen at present doing their military service would also be used. It was hoped to start these services early in November, first on suburban sections and later on trunk lines. In the meantime, special bus services had been placed into operation parallel to railway lines, and Buenos Aires Transport had considerably increased its services wherever possible.

Many trains were stopped at intermediate points when the strike was declared, including several cattle trains, on which the stock was left to die. Perishable goods were left to rot in a number of other cases.

The Government made its position quite clear in a statement to the country in which it made the following points: The rationalisation programme will be carried out in its entirety in spite of the uncompromising opposition of the unions; the railways will remain Argentine; the eight-hour day will be respected; staff declared redundant will receive an indemnity although there is no legal obligation for this; railwaymen will have priority in official housing schemes; and all co-operative societies formed by railwaymen to take over ancillary services will have the right to take over these if they can make an offer equal to the best received from private sources.

The crisis has now reached a stage at which definite decisions must be taken one way or another, and the next four weeks will see how the future of the Argentine railways will develop.

Developments in Liberia

CONSTRUCTION now proceeding of an entirely new ore railway in Liberia, where there are no public railways, is due to an American-Canadian-Swedish consortium. The Swedish partner is the Trafik A.B. Grängesberg-Oxelösund, which, since its well-known railway connecting the Eskilstuna area with the Baltic ore port of Oxelösund was absorbed into the Swedish State Railways, has been seeking fresh outlets for its capital, which would be in line with its existing mining interests.

For many years there has been a 45-mile railway extending from Monrovia to Bomi Hills, and further track beyond, belonging to the Liberia Mining Company, an offshoot of the Republic Steel Corporation in the U.S.A. This railway is operated mainly by General Motors diesel locomotives of 975 and 1,425 b.h.p., generally with moderate axle loads. Centralised traffic control equipment for the section from the coast to Bomi Hills junction has recently been ordered from North America, and eight of the diesel locomotives are to be fitted with a.t.c. and cab-signalling apparatus.

The New Liberian Mining Company (Lamco), beginning from scratch, has been able to base its proposed operation on modern methods of handling concentrated single-freight traffic. The rails being laid are of approximately 130 lb. a yard and are intended to take axleloads up to 30 metric tons. Ore trains of about 8,000 tons trailing are to be worked from the high-percentage ore fields in the north of Liberia to the Atlantic coast in bogie wagons of 100 to 120 tons capacity. Some 400 of these have been ordered from Ferrostaal; 160 of them, of 120 tons capacity, have been sub-contracted to the Westwaggon Works of Klöckner-Humboldt-Deutz, and the remainder will be built at the Dortmund plant of Ferrostaal's subsidiary,

Glassing & Scholwer. All wagons are to be equipped with the Knorr KE air brake; when fully laden these cars are to have the maximum axleload permitted, as will ten remarkable locomotives ordered from Henschel-Werke. These are to be of diesel-hydraulic C-C type weighing 176 metric tons with full supplies. Each is to be powered by a General Motors 1,900 b.h.p. engine, and in contour it is to be of road-switcher type akin to the well-known Electro-Motive G.16 model. Two of these locomotives are always to be used in multiple-unit, giving a combination of 3,800 b.h.p. and 352 tonnes weight at the head of a 50-car train of about 8,000 tons weight, fitted throughout with automatic centre couplers, and running up to speeds of 65 m.p.h.

Level-crossing protection

FOR some time past the Institution of Railway Signal Engineers has followed the commendable practice of issuing booklets specially prepared for study by students of the Institution before taking the Railway Signalling Section of the examination for Associate Membership or Graduate Membership of the Institution. The first booklet of a new series to be published deals with level-crossing protection, and has been written by Mr. P. A. Langley, Assistant Signal Engineer (General) of the Eastern Region of British Railways. The subject of level crossings in general is a complex one, because of the varieties of circumstance in which level crossings are installed and used, and this booklet opens by giving a brief survey of the present position in Great Britain. Although for some time Parliament has not permitted public-road level crossings to be made over new or existing railways, except in very special circumstances, there still remain in Great Britain at the present time 4,386 public-road level crossings equipped with gates, 280 public-road crossings without gates, and 19,701 occupation crossings. The latter type of crossing is provided with field-type gates which open away from the railway line and include those for private and accommodation use. In general the protection arrangements to be provided at crossings vary according to whether the road is public or private, and according to the type of railway line; whether passenger, goods, electric, or light railway, and the number of tracks to be crossed. In addition certain statutory requirements must be observed in the provision of equipment for level crossings, and because of this Mr. Langley deals comprehensively with the legal aspects at the beginning of his booklet.

The technical details of level-crossing equipment and operating gear are dealt with in a manner that will not only be of great value to students of the subject, but also such as to constitute a very useful handbook on a branch of the railway signal engineer's work that is not always as clearly understood as it might be. The great majority of level crossings in this country are controlled and operated by manual equipment, and the booklet is lavishly illustrated with excellent diagrams covering the various forms of layout that are most commonly found. The subject of interlocking with signalling and block equipment is also covered, together with such adjuncts as road warning signs, traffic lights, and so on. Full information is given regarding the railway rules and regulations concerning the working of crossings. In these days some attention is naturally given to the elimination of the manual work in operating gates, though in providing for power operation practical difficulties occur due to varying conditions of inertia effects on the gates themselves, together with the need for coping with varying weather conditions and with any unforeseen obstruction. Any form of operating mechanism requires to have a degree of flexibility sufficient to compensate for a widely varying range of such conditions. The booklet describes in detail an oil-gate machine which can be controlled either electrically or pneumatically, and which provides the flexibility which is desirable in such service.

The most interesting part of the booklet concerns the changing situation today, arising from the British Transport Com-

mission Act, 1954 (Section 40), which gave the railway authorities power to substitute lifting barriers for gates at public level crossings. A further Act of 1957 granted powers that were much wider in application since it enabled the Minister, by order, to vary or dispense with any of the local obligations imposed at public level crossings, such as the provision of assistance, the maintenance of lodges, and the provision of gates. Until this Act came into force such objects could only be achieved by a Parliamentary Bill or a Light Railway Order. So far as barriers are concerned three variations are now provided for: manned level-crossing barriers which can be either mechanically or electrically operated; remotely controlled barriers, and automatic half-barriers at unattended crossings.

Installations of the latter type would enable considerable economies to be effected by dispensing with crossing keepers, the maintenance of gate boxes, and so on. There is a restriction upon the circumstances in which such crossings can be changed to the automatic half-barrier type. At the present time the understanding is that the system is not to be applied to any crossings where the road traffic exceeds 1,000 motor vehicles a day.

Eight months of U.S.A. railroading

BY A CORRESPONDENT

THE A.A.R. statement of railway revenues and expenses at August 31 shows a slight improvement in the state of the U.S.A. railways. In the month of August freight receipts were up \$16 million (2.4 per cent), but passenger revenue was \$1.7 million lower (2.7 per cent) and parcels traffic brought in \$2.2 million less, a drop of a quarter. The Post Office paid \$3 million more for carriage of mail, so that total revenues were \$16 million higher, or 2 per cent. Operating expenses were down \$21.4 million (3.3 per cent) and the railways

operated at a ratio of 76 per cent against 80 per cent in August, 1960.

Though the headlong decline in operating revenues was checked, total receipts for the eight months to August 31 were \$460 million, or 7 per cent below those of 1960, while expenses were reduced by \$288 million, or 5.6 per cent, an operating ratio of 80.5 per cent on two-thirds of the year against 79 per cent in 1960, was too high for the whole railway system. It meant that 23 railways were in deficit, the New York Central, Erie & Lachawanna and New Haven, being each short of over \$15 million, and the Baltimore & Ohio of \$14 million. The Pennsylvania was only \$6 million short by dint of a 9.1 per cent reduction in expenses, but it cannot make ends meet with an operating ratio of 88 per cent.

The railways in the Eastern District suffer from the failure of the steel industry to recover from the effects of the 1959 strike. Its output this year to November 13 was 6,161,200 tons, nearly 7 per cent below last year. To a large extent that accounts for a 9 per cent decrease of wagon-loadings in October of over 2 million or 9 per cent, compared with 1960, and 1959 forwardings. The highlight in current statistics is the ability of the Northfolk & Western to operate at a ratio of less than 60 per cent, and to earn more from 2,743 miles of road than great railways, like the Santa Fé and Southern Pacific, gain from working over 10,000 miles of road. At present there is no sign of an upsurge in traffic volume which will produce more revenue and curtail working costs over the whole U.S.A. railway system of 220,110 miles of road. At the end of August the railways were left with a net railway operating income of \$256 million (earnings before charges), \$143 million, or 36 per cent, less than in August, 1960. The rate of return on property investment for the previous 12 months was a mere 1.6 per cent against 2.4 per cent a year earlier. Present trends should impress the U.S.A. government with the need to review the national transport policy without delay.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

RAILWAYS AND THE CLERGY

November 13

SIR, Referring to Mr. A. D. F. Howard's letter in the October 13 issue, no doubt the following information will be interesting.

In the rulebooks of the old private railway companies it stated that "railway servants were expected to attend church on Sundays when not required for duty." Another reason for the connection of church and railways was that stationmasters at country stations were expected to be sidesmen or hold some other office in the local church.

When a lad wished to join the railway service he was expected to obtain a reference from the local Minister. This went a long way to getting employment on the railway. Train services during Sunday morning church-hours were reduced to a minimum to avoid distraction and disturbance to the congregation in churches near the lineside.

Yours faithfully,
H. HILL

25, Alderman's Hill,
Palmer's Green, N.13

BUSINESS TRAVEL HABITS

November 6

SIR, The article in your issue of November 3 on "Changing business travel habits" has been read with interest. The lack of adequate facilities for several hours' business either in London or Plymouth has been taken up over recent years by this Chamber, more especially in view of the expanding industrialism in the South West.

While the new Up services to which you refer give industrialists from Plymouth adequate time in London to carry out their business and return the same day, the same cannot be said for London executives visiting Plymouth. The earliest arrival in Plymouth is 12.23 p.m., which means leaving Paddington at 5.30 a.m., the alternative being 1.22 p.m. (Paddington depart 8.30 a.m.). This latter arrival time may not be too bad but, when it is realised that one has to leave Plymouth at 4.30 p.m. in return, it will be seen the time allowed for business is far from adequate. The alternative is the night sleeper service.

We have been pressing for years for a later departure than 4.10 p.m., the necessary hour until the introduction of this new timetable, and still contend that there should be a train leaving Plymouth at 5.30 p.m. to 6.30 p.m. to enable adequate time for business commitments.

Yours faithfully,

GRAHAM J. JINKS
Secretary

Chamber of Trade & Commerce,
Tavistock Road, Plymouth

MODERNISATION AT SHENFIELD

November 7

SIR, I refer to the letter from Mr. John Rodgers in your November 3 issue, in which he relates the sad story of the Shenfield indicators.

The remedy is obvious. A suitable selection of painted boards, printed departure lists giving details of platforms and headcodes, and carefully-timed loudspeaker announcements has

served the Southern well for many years. With a little effort by the staff, this combination provides clear, adequate, and virtually infallible directions, and this at a cost which I imagine is a very small fraction of that of the elaborate apparatus installed at Shenfield—and elsewhere.

Simplicity has indeed many advantages !

Yours faithfully,

C. F. WELLS

76, Sandlands Road,
Walton-on-the-Hill, Surrey

RAILWAYS INTO ROADS

October 16

SIR, When Mr. R. T. Munns will be so good as to tell me how many passengers and how much freight the trains on the Great Central are carrying I shall be very pleased to work out exactly how many road vehicles will be required to do the work.

As for the task of converting the Great Central into a road, this should be a very simple matter as it is never less than double track and nearly all the crossings are carried over or under the track.

I do not agree with the latter part of his letter and, judging by the ever-increasing use of road vehicles, neither does the majority of the general public.

Mr. Munns may consider our road system to be adequate, but I would point out that Western Germany, which is very similar to Britain in both size and population, has over 1,600 miles of Autobahn while Britain has only 150 miles of motorway. Germany's road system is a long way from being adequate and most Germans realise this, but it is very much better than ours. We must catch up with and overtake German achievements, and in my opinion the only way we can do this is by converting some of our railways into roads.

Yours faithfully,

W. D. MITCHELL,
Haulage Contractor

26, Tranby Avenue,
Hull Road, York

November 6

SIR, I found Mr. M. J. Douglass's letter on the Great Central Railway one of the most sensible in this long " Railways into Roads " controversy.

It seems obvious to me that the major part of the Great Central Line will be closed in the next few years, and it cannot possibly survive once the M.1 has been extended northward from Crick to Doncaster.

As a reserved roadway, it can still play a very useful part after the motorway has been built as it will go right through the towns, providing them with urban motorways and on the sites of the stations and other railway land giant car parks and bus stations could be constructed.

Surely, the best way to deal with surplus railways throughout the country is to give them a new life as reserved roadways? They then can play a vital part in making the country prosperous, instead of being a disastrous liability.

I think that even your diehard railway enthusiasts will be pleasantly surprised by the results of railway conversion as these splendid routes will be carrying far more traffic than their Victorian builders ever dreamt of.

Yours faithfully,

C. WILSON

Greystones, Aldborough Road,
Boroughbridge, Yorkshire

November 7

SIR, Mr. Mitchell started this correspondence off with a suggestion to convert the Great Central line from London to Sheffield; I repeat from London to Sheffield. Just as two swallows do not make a summer the railway movements at

Marylebone and Great Missenden cannot be the criteria for closing the Great Central. Mr. Douglass could not have made his observations from two less promising places. Both can be justified only by suburban passenger travel. If Mr. Douglass thinks 8.0 to 8.40 a.m. is in the " rush-hour " period then he does not know the Marylebone suburban clientele; the rush-hour is more like 8.41 to 9.31 a.m. Surely he does not accuse British Railways of wastefulness in running a train for two passengers for Great Missenden and two for beyond? What value can be placed on his observation without knowing the passenger loadings of the particular train for the throughout journey in both directions—the out and home working of the engine, coaches and crew?

What is sadly evident is that most of your correspondents think only in terms of passenger services and completely overlook the fact that the freight services greatly exceed them. What is more, the traffic is not " between London and Sheffield "; density is at its greatest between Banbury/Woodford and Sheffield.

Apart from the width of the Up and Down tracks, anyone with a little knowledge of the Great Central line knows it is a succession of cuttings and embankments, with some tunnels, and conversion into a motor highway could only be at a fantastic cost. In the past it has operated in all weathers with safety. Would the conversionists be satisfied to duplicate the M1 record of 241 accidents and 24 deaths in a twelve-month?

Let us face it, all the conversionists want is for the Government to give them a highway. Would they be willing to pay the full market price if the vendor were another private company?

The destiny of the Great Central line could very well be left to the professional railwaymen, not to politicians or, heaven forbid, to the many amateurs who know it only as a line on a map.

Yours faithfully,

R. T. MUNNS

16, Boundary Road,
St. Johns Wood, N.W.8

November 7

SIR, If a main line railway is converted into a road the only way in which it can be made to carry anything like as many passengers is by restricting it to public service vehicles. If this is done, then the only advantage of a road, i.e., door-to-door service, is lost.

Yours faithfully,

D. OSMAN

7, Warren Street,
Alvaston, Derby

November 3

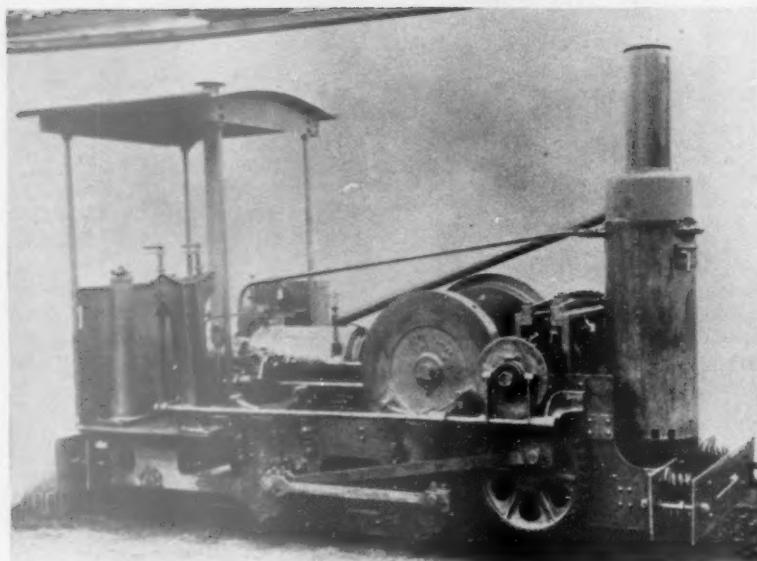
SIR, Your readers may be misled if they are not told that Mr. M. J. Douglass made his journey from Marylebone to Nottingham on a Saturday morning when there is indeed only one " commuter " arrival at the terminus between 8 and 8.40 a.m. (there are others at 7.50 and 8.46 a.m.). On Mondays to Fridays, there are seven arrivals between 7.50 and 8.51 a.m. If he continued his journey in the same train and returned by road from Nottingham, how did he manage to find 20 minutes in which to view the sights of Woodford Halse? Mondays to Fridays freight trains pass in both directions about every half-hour through the day and night. Main-line trains do not stop at Great Missenden. Presumably Mr. Douglass saw the 4.55 p.m. (Saturdays only) all stations Brackley to Harrow, then Marylebone, an extension of the suburban service. Diesel trains and a better service have been promised when more units are available from the manufacturers.

Yours faithfully,

R. G. R. CALVERT

45, Woodwaye,
Oxhey, Hertfordshire

The Scrap Heap



Railway engine powered by 20 h.p. Hornsby-Akroyd oil engines

An early use of the oil engine

One of the "stills" used in the Shell-Mex & B.P. film, "A history of the oil engine," depicts a railway engine built in 1900, and powered by a 20-h.p. engine.

Manufactured by Hornsby-Akroyd, it is an example of the uses to which the oil engine was put within a few years of its inception. Herbert Akroyd-Stuart, the Buckinghamshire engineer who designed the engine, patented the first airless-injection oil engine in 1890, and the first model was made in 1890 by Richard Hornsby & Sons.

Stationmasters, for the use of?

"Hats brushed and ironed" reads a sign tucked away in a corner of the washroom at Victoria Station, British Railways, Southern Region.—From the "Evening Standard."

Fame at last

There were cheers recently when the 7.48 p.m. Berwick to Edinburgh train left Berwick Station. On board were six passengers, including four newspaper representatives and a British Railways public relations official. Fame had come to the service after the Minister of Transport had informed the House of Commons that it cost £164 for every 10s. of receipts and that its daily number of passengers varied between two and eight. The sole "paying" passenger on the train said that this was the first time she had had company for three

months. The total receipts for the journey was 36s. 3d.

Brunel bar

The second phase of the reconstruction of Plymouth North Road Station, Western Region, British Railways, is complete. The accompanying illustration shows the Brunel bar with Warerite pictorial panels (left to right)

Clifton Suspension Bridge, the Great Eastern, and Saltash Bridge. Behind the bar are smaller Warerite panels depicting vintage steam engines of the Brunel era.

50 years ago

At the Royal Automobile Club tonight, at 9 p.m., Mr. Philip Dawson, Consulting Electrical Engineer of the London Brighton & South Coast Railway, will read a paper entitled "London to Brighton in 45 minutes." Lord Bessborough, Chairman of the Brighton Company, will preside, and the paper will be illustrated by limelight views and cinematograph.—From "The Railway Gazette" of December 8, 1911.

Crystal clear

Thirsty travellers on the New South Wales and Victoria State Railways will soon be able to drink out of full lead crystal glassware. The glasses, which are engraved with English roses, are being manufactured in Stourbridge, Worcestershire, and are part of a consignment of over 2,700 pieces to be sent to Australia. From the "Wolverhampton Express & Star."

Radio times

The Minister of Transport, Mr. Ernest Marples, has rejected a suggestion for a ban on the playing of transistor radios in railway trains.



Brunel bar at Plymouth North Road Station

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

DENMARK

Copenhagen Central Station

The Central Station at Copenhagen celebrates its 50th birthday today, December 1. The first station was a wooden structure built in 1847 as part of Denmark's first railway from Copenhagen to Roskilde. This was replaced in 1864, and the present station was opened on the site of the first on December 1, 1911. Approximately 70,000 passengers and 750 trains are handled by the station every day.

Private lines to close

The private railway line Horsens Privatbaner is to close on March 31, 1962. The railway at present consists of two lines from Horsens to Thyvegod and Horsens to Ejstrupholm.

CANADA

Locomotives ordered by Argentina

Argentine State Railways has ordered 70 diesel locomotives from Montreal Locomotive Works Limited. The order was made possible by long-term credits provided by the Export Credits Insurance Corporation, which is providing credits worth \$12.5 million repayable over 9½ years. Two sub-contractors who will play

a major part in the order are Canadian General Electric Co. Ltd. and the Dominion Engineering Works Company. Montreal Locomotive Works Limited is also hoping for an order from Brazil.

RHODESIA

C.T.C. extended

On November 22, the 35-mile section between Zimba and Kalomo in Northern Rhodesia was brought under the Livingstone control panel. This panel controls train movements from Thomson Junction (Wankie) to Kalomo, a distance of 162 miles. The Salisbury panel will control 180 miles of track between Gatooma and Headlands (Southern Rhodesia) when the 41-mile Marandellas to Headlands section is brought under control later.

Hire of diesels

Rhodesia Railways is to hire 30 diesel-electric locomotives from two British companies for a period of 10 years, at a cost of £3 million. The locomotives will be in service by 1964 and will replace obsolete steam engines. At the end of the 10-year period Rhodesia Railways will have the right to continue the hiring arrangement for a further period at favourable rates. The significant feature of this arrangement is that, had the locomotives not been obtained in this

way, £2.7 million of loan capital would have had to be provided for their purchase. These funds will now be released for other railway projects.

Reduced running times

Tests carried out between Salisbury and Umtali with these locomotives show that the running time can be reduced from 6½ hr. to 4½ hr. and the journey from Beira reduced from 22½ hr. to about 11½ hr. It is estimated that the service will result in savings of £55,000 a year on operating costs and £170,000 on coaching-stock.

GHANA

German rolling-stock

Ghana Railways has taken delivery of 12 passenger coaches from West Germany. A total of 26 of these coaches has been ordered at an estimated cost of £G.700,000. Improved passenger services are being run between Accra and Takoradi.

CHILE

Order for French locomotives

The Chilean State Railways (Empresa de los Ferrocarriles del Estado) has ordered 49 diesel-electric locomotives and spares from the French company Brissonneau et Lotz S.A. Of 825 h.p. and weighing 72 tons, the locomotives are being built for the 5-ft. 6-in. gauge which comprises 1,763 route-miles of the total for Chile of 3,570 route-miles.

QUEENSLAND

Tenders for Mt. Isa project

The Queensland Government has received three tenders for the last major stage of the £A.30-million railway construction project linking Mt. Isa with Townsville and Collinsville.

WESTERN AUSTRALIA

Locomotive operating costs

The two Clyde-G.M. 1425/1310-b.h.p. "A" class locomotives put in service on Western Australian Government Railways in 1960 recently ran a total of 100,000 miles in 51 weeks. During this period the two locomotives handled 106 million gross ton-miles at an operating cost of 81d. per 1,000 gross ton-miles. It



Marshalling yard at Lanchow in north-west China

is estimated that the saving in operating costs compared with steam haulage will enable the capital cost of these locomotives to be recovered in two years.

VICTORIA

Melbourne underground railway

Preliminary work to determine construction methods for Melbourne's underground railway will be completed soon. The estimated cost of the railway, which will be served by four underground stations, is £A.30 million. No date for commencing excavation work has at present been given.

NEW ZEALAND

Reconstructed stations

The New Zealand Minister of Railways is to open three stations this month: at

Fielding, New Plymouth, and Stratford. Fielding Station will replace an 84-year-old structure extensively damaged by fire in July, 1960. At New Plymouth, the 60-year-old building has been rebuilt. Stratford Station completes the end of an extensive project involving the rearrangement of Stratford marshalling yards and the construction of a 1½-mile deviation to link the Stratford-Okahukura branch with the station.

In Brief

Gabon. Preliminary work should commence by the end of the year on the planning of a line linking the iron ore mining areas in north-east Gabon to the new port installations at Libreville.

Iran. A Japanese sales team arrived in Teheran in October to negotiate sales of locomotives and railway equipment.

Philippines. It is reported that work has commenced on the construction of the 340-km. extension from San Jose to Tuguegareo.

Portugal. An order worth N.F. 1 million for equipping a new depot for the Portuguese Railways at Entroncamento has been obtained by Société Felco of France.

Spain. Two diesel-driven rotary snow ploughs built by Rolba A.G. of Switzerland have been ordered by Spanish National Railways.

Sweden. A "piggyback" service has been inaugurated between Stockholm, Gothenburg, Malmö, and Helsingborg.

Tanganyika. Plans for a 24-mile extension of the railway from Kilosato to Mikumi have been approved. Capital requirements for some £1.2 million have yet to be secured.

PUBLICATIONS RECEIVED

Molybdenum Disulphide in Action. Second edition of a publication issued by K. S. Paul (Molybdenum Disulphide) Limited, of Angel Lodge Laboratories & Works, Angel Road, London, N.18. Exceptionally clearly illustrated, the booklet contains some theoretical information; extracts from users' comments on Moly-Paul products; a list of scientific papers on the subject of Molybdenum Disulphide; an informative index, and a list of the various grades mentioned with the necessary specification.

Copper and Copper Alloy Castings. The Association of Bronze & Brass Founders, 69, Harborne Road, Edgbaston, Birmingham, has seized the opportunity presented by the issue of a revised British Standard Schedule of Copper Alloy Ingots and Copper & Copper Alloy Castings to publish a companion volume to the standard. The publication is primarily intended for distribution to the members of the Association. It is a guide to the alloys, their uses, properties, and casting characteristics. Copies of the volume may be purchased from the Secretaries of the Association, price £1 1s. post paid.

Electricity in Transport. By B. K. Cooper. Frederick Muller Limited, Ludgate House, 110, Fleet Street, London, E.C.4. 7½ in. x 4½ in., 143 pp. Illustrated. Price 9s. 6d. This addition to the Mechanical Age Library deals with the many uses of electricity in all the fields of transport. The author discusses the various aspects of electrical engineering in simple language, and his explanations are amplified by some excellent and up-to-date photographs and line diagrams

much simplified to illustrate only the device under discussion. He succeeds in presenting some of the very latest devices, as well as the old and tried methods with a clarity which enables the layman to follow the explanations easily. Mr. Cooper has realised that the modern layman has an elementary knowledge of electricity enough to enable him to follow a diagram or to appreciate the implications of series, or parallel winding for example. His treatment of electricity in aircraft and on airports of necessity leaves much of the electronics to be dealt with elsewhere, but he deals comprehensively with airport lighting. As a guide to the equipment now in use in all forms of transport, for use by the average layman, this book will provide most interesting reading.

Facts on Cold Extrusion. This brochure has recently been issued by Forgings & Presswork Limited, a member of the Birfield Group of Companies, and is available from Forgings & Presswork Limited, Birch Road, Witton, Birmingham, 6. This process, only recently perfected for full scale production, is described and numerous extrusions are illustrated. Components which lend themselves to this type of manufacture, and the alterations of design involved are used as examples and the sizes, tolerances and economical quantities involved with this process, are listed, together with the size and shape of forging recommended.

Humidity Instruments. A leaflet issued by the Cambridge Instrument Co. Ltd. describes the range of the manufacturer's instruments in this field. Hygroscopic and wet and dry bulb humidity indicators,

recorders, and controllers are described and listed. The leaflet begins with an introduction to the measurement of relative humidity and illustrates the two common methods of measurement. Instruments described include a hygroscopic indicator, mechanical and electrical wet and dry bulb recorders, combined temperature and humidity recorders, and various controllers, including a multi-point electronic recorder/controller. A short bibliography is included.

Rock Mechanics. by Henry R. Reynolds. London. Crosby Lockwood & Son Ltd., 136 pp. 8½ in. x 5½ in., illustrated with photographic and diagrammatic plates. 21s. This record of study and development during the past 21 years of soil mechanics is generally confined to the weaker rocks or soils. It is designed as a textbook and reference work for civil engineers to facilitate foundation problems. Considerable space is devoted to tunnels, including details of such presently-constructed works as the Great St. Bernard and Mont Blanc tunnels. The palaeontological investigations recently establishing continuity in the Lower Chalk across the Straits of Dover are discussed in detail as vital to the Channel Tunnel scheme. Earlier chapters are devoted to physical and structural geology generally as it concerns the engineer. Valuable formulae and tables of such matters as the modulus of elasticity of rocks are included, and in mineworking subsidence are dealt with. A chapter on geophysical prospecting is useful and rock slides and slips are briefly touched upon. Perhaps the more generally important subjects covered are the engineering properties of rocks and tests.

DIESEL MAINTENANCE DEPOT at Cricklewood

CRICKLEWOOD diesel depot has been designed for the maintenance of diesel locomotives operating on the London Midland Region between St. Pancras, the Midlands, and the North, and railcars on the St. Pancras suburban lines. Approximately 150 main-line and shunting locomotives and 75 railcars will eventually be based on this depot for maintenance.

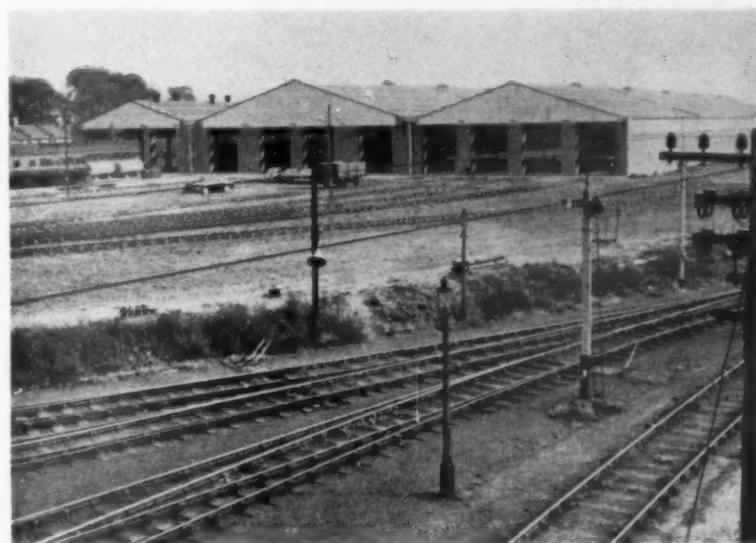
Facilities provided include equipment to deal with all types of diesel-engine vehicles in this Region, including removal of power units from railcars, bogies, and their attendant running gear from both railcars and locomotives, and tyre-profiling.

In the main shed, which is a three-span portal frame building, one bay is used for railcar maintenance, one for locomotive maintenance, and the centre bay for heavy repairs.

Lowered floor

The locomotive maintenance section consists of four through roads, with inspection-pit accommodation for six locomotives in each road. In the northern half of the shed, the floor level is 1 ft. 9 in. below rail level to provide a convenient working height for inspection and maintenance. In this lowered floor area, raised platforms are provided between the roads for working on equipment in the body of the locomotive. These are carried on a central row of pillars for the full width between the roads. Recessed

Accommodation for diesel locomotives and railcars for use on St. Pancras main-line and suburban services



Exterior view of the new depot

bulkhead lighting is provided in the pits, and lighting and power points on the raised platforms. General lighting is fitted below the platforms.

In the heavy repair section are three single-end roads, two of 450 ft. and one

of 260 ft. The floor is at rail level and a full-length inspection pit is provided for each road. On the short road locomotive and railcar bodies can be lifted by means of four 25-ton Matterson electric lifting jacks. The jacks are positioned to suit the lifting points on the vehicle by hydraulically-operated trolleys, the deck over the operating area being strengthened. Each jack is an independent unit. Controls are arranged for the simultaneous or selective lifting of the four jacks.

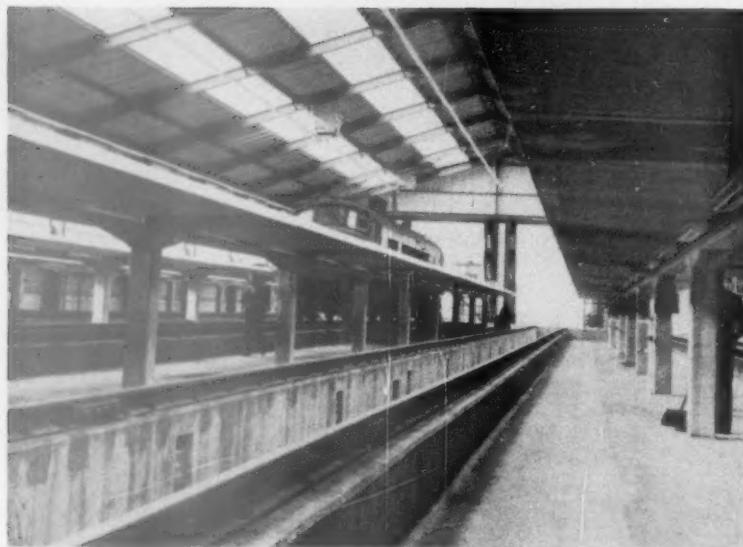
For wagon loading and unloading, there is a 35-ton electric hoist over the entrance end of the short road. General lifting of equipment in the heavy repair section is by a six-ton electric travelling hoist. This straddles two roads, the overhead tracks being carried on stanchions.

Hydraulic drop-table

For changing railcar engines and transmissions a suitable hydraulically-operated drop-table is incorporated in the central road. Wheel-profile truing is carried out on a pit-type Atlas machine on which the wheel tread and flange, up to 54 in. dia., of all types of vehicle can be trued without removing the wheels from the vehicle. This machine, which



Lowered floor level in railcar section to facilitate underfloor engine servicing



Raised platforms, lowered floor level, and inspection pit provides three servicing levels

is available for use by other L.M.R. depots, is also installed in the central section.

Workshop accommodation in the heavy repair section includes a fitting and light machine shop, electricians' shop, and a room for fuel-injector testing and cleaning. This is equipped with a Hartridge motorised test unit and a Merlin hand-operated set.

Cleansing equipment at the depot includes an Intermittent air filter washing, and oiling plant for the large panel-type filters fitted on diesel locomotives and Mann Egerton pressure-cleansing tanks for small components. Portable spray-gun cleaners are used for underfloor power units and bogies.

Bulkhead lighting

The railcar section of the depot for the maintenance of multiple-unit stock consists of three single-end roads, each capable of holding two four-car units. Inspection pits are provided over the full length and the working floor level outside the pits is lowered below rail level. Bulkhead lighting is fitted along the pit sides and 50-V. power sockets are provided for hand lamps, small tools, lubrication dispensers, greasing, and cleaning equipment. Fuel oil is stored in bulk in six tanks each of 10,000 gal., and lubricating oil in a 6,000-gal. tank. Lubricating oil supplies are pumped to dispensing points in both locomotive and railcar sections of the depot. Mobile dispensers are used to deliver metered quantities of oil to railcars but, in the case of locomotive engine sump oils, metered quantities are pumped direct into the sump.

Pressurised greasing is carried out with Castrol Industrial grease dispensers fitted with motor/compressor sets. The water supply for train-heating boiler

tanks is drawn from the nearby water treatment plant for steam locomotives. For vehicle battery-charging eight Legg chargers have been installed.

Running spares for all types of diesel stock operating in the Region are held in the stores.

Staff accommodation

Staff accommodation includes an office block, messrooms, locker and drying rooms, and washing facilities. The depot is heated by roof-mounted blower-fan radiators which are supplied by two automatic oil-fired John Thompson Multipac boilers. These are arranged to burn waste lubricating oil to supplement the boiler fuel supply. Insulated asbestos sheeting is used for the building side walls

above the glazing, and the roof is formed of insulated metal decking with patent double glazing. Folding doors are fitted at the entrance to each bay.

The main contractor for the depot was Harbour & General Works Limited. Sub-contractors include the following :

Piling	...	...	West's Piling Co. Ltd.
Heating	...	...	§ Norris Warming Co. Ltd. ; William Freer Limited
Boilers	...	...	John Thompson (Wilson Boilers) Limited
Lighting	...	...	Kilpatrick Limited
Wheel profiling machine	...	...	Atlas Engineering Co. Ltd.
Lubricating oil dispensers	...	...	Castrol Industrial, Limited
Filter cleaning equipment	...	...	Intermit Limited
Locomotive lifting jacks	...	...	Matterson Limited
Engine-changing drop table	...	...	Access Equipment Limited

HOPPER DREDGER FOR BRITISH TRANSPORT DOCKS

A hopper dredger for British Transport Docks, the twin screw, twin suction *Afan*, has recently completed trials on the Humber.

Built at the Hessle shipyard of Richard Dunston Limited, the *Afan* has been specially equipped for clearing sand from shipping lanes in the Bristol Channel. Each of the four hydraulic rams controlling the doors of the 1,000 cu. yd. hopper well has a maximum pull of 90 ton, and the discharge rate of each of the two 20-in. dredging pumps is 9,800 gal. per minute. Dimensions are: length, 185 ft.; breadth, 37 ft., and depth, 16 ft. The total installed generating capacity of 1,168 kW. is supplied by two 920-b.h.p. diesel generators.

Generating machinery, accommodation and wheelhouse are positioned aft, with pumping machinery forward and hopper amidships. The speed of the vessel in loaded condition is 10 knots.

The complete diesel-electric propulsion and pumping installation has been supplied by Brush Electrical Engineering Co. Ltd. Motors and starters for most of the auxiliary services aboard, and control gear for remote control of the two 600-h.p. electric propulsion motors and all dredging operations have also been supplied by that company.



Lifting facilities in the heavy-repair section include four electric lifting jacks

ELECTRIC TRAIN SETS in Holland

Total of 150 new vehicles with up-to-date details now in course of delivery

A CONSIDERABLE amount of new electric stock is now in course of delivery to the 1,500-volt d.c. system of the Netherlands Railways (N.S.). It comprises 26 four-car train sets and 23 electric two-car sets, similar in principle to the 47 four-car and 45 two-car sets acquired over the years 1956-59, but with some modifications in detail. As with the 92 earlier trains, the 1961-62 deliveries are from the Utrecht plant of Werkspoor N.V., and include the bogies and other constituents developed and perfected by that builder.

Though the same in construction and details as far as possible, the seating arrangements of two-car and four-car sets differ somewhat; in particular, the four-car set includes a small kitchen. Both train types can be coupled in multiple unit with each other or with any other multi-car d.c. trains of the N.S.

General dimensions

General dimensions and particulars of the four-car set are given in Table I, and of a two-car set in Table II. A two-car unit is made up of a coach with first and second class compartments and a second class coach. The four-car set comprises one first class coach, two second class coaches, and a second class coach with kitchen and a small refreshment compartment.

TABLE I—FOUR-CAR TRAINS, N.S.

	ft.	in.
Total length over buffers	326	5
Length of a motor-coach	81	10
Length of a trailer coach	77	2
Bogie pivot pitch	60	0
Bogie wheelbase	9	10
Wheel diameter	37	1
Empty weight of train	206	tons
H.P. installed	2160	h.p.
Seating capacity :		
First class	48	
Second class	190	
Total	238	

TABLE II—TWO-CAR TRAINS, N.S.

	ft.	in.
Total length over buffers	167	7
Length of each coach	81	10
Bogie pivot pitch	60	0
Bogie wheelbase	9	10
Wheel diameter	37	1
Empty weight of train	105	tons
H.P. installed	1080	h.p.
Seating capacity :		
First class	24	
Second class	96	
Total	120	

The bogies are exactly the same as those of the multi-car trains built from 1956 onwards and which have given excellent riding qualities in new condition and also with worn tyres and horn

guides. All these previous Werkspoor bogies have run at least 160,000 miles between tyre re-turning, but some bogies have run 200,000 miles or more before tyre re-turning. The wear of the horn guides is small, and not before 1.5 million km. (930,000 miles), i.e., 7½ years of service, is it expected that any axlebox guides will need replacement. These features have been attained by the application of braking to the rotational movement by using a centre-pivot with a large friction plate, combined with the traction-links between bolster and bogie frame.

Body design

The all-steel coach bodies are of completely-welded construction; the underframe, roof, and side-sheeting form an integral load-bearing structure, and each car body can withstand a buffing load of 200 tons without plastic deformation. A body frame is built up of rolled-steel sections of 25 to 30 tons u.t.s., and the pillars are welded to the side-sheeting, thus giving a strong and rigid construction. The body sides are made of 2.5 mm. steel sheets; the roof sheets are of corrugated form with small circular corrugations pitched at 25 mm. (1 in.) centres, thus avoiding the application of purlins. The cantrail consists of a

rolled Z-section, and the underframe is of channel sections with strengthening sections added below the entrance doors. There are no centre longitudinal members, but between the end sections the solebars are tied by channel-section cross-members. Over the underframe is a top corrugated floor plate 1.25 mm. thick and 37 mm. deep, which is filled in with cork.

Nose construction

To afford the greatest possible protection for the driver, the end coaches have been designed with a reinforced nose construction, based on the considerations that the nose should be strong enough to reduce damage in minor collisions but should not be so strong that in a heavy collision it would remain intact, causing the damage to occur in the sections behind the nose.

Hence, the construction had to be such that in a serious collision a maximum of energy would be absorbed by deformation of the nose. A careful study was made to determine the correct slope of the windscreen in connection with snow and rain; also the design of the coach head had to be such that it would offer the least possible air resistance. It was necessary to avoid an unnecessarily complicated design because of reinforcement which had to be provided inside the sheeting, and certain aesthetic requirements had to be fulfilled. A number of models were tested for air resistance, rain, and snow accumulation at the National Aeronautics Laboratory at Amsterdam. All



Four-car electric train set for the Netherlands Railways

this resulted in a train end construction with the best possible head and tail resistance within the limits set by the requirements mentioned above.

Sound insulation

As the running properties of the bogies used since 1956 have been good, it has been found that passengers now pay more attention to satisfactory sound insulation. To reduce weight, the sound and heat insulation has been formed of a layer of anti-vibration material 2-3 mm. thick and with fibreglass for roof, sides, and front walls.

The train sets are also equipped with side and bottom skirts, a standard construction on Netherlands Railways rolling-stock which affords protection for the apparatus mounted under the floor and contributes toward sound insulation. This construction also reduces air resistance. The underside of the corrugated floor plates, the insides of the skirt plates, and the upper sides of the sub-floor enclosure are sprayed with a sound-absorbing anti-drumming material; the end skirt sheets themselves are of reinforced structural polyester. An extra plate is fitted under the floor above the bogies and the space thus formed is sprayed with asbestos, which affords additional sound insulation at the point of the noise source.



Interior of second class compartment

Careful attention has been given to the suspension of rotary machines, such as the air compressors and the motor-driven generators for control current and electric power for the kitchen and lighting installations. The compressor suspension is designed so that the transverse beams, to which the compressor framing is attached, have been kept free from the floor plates, so that any vibration not absorbed by the silentblocks cannot be transmitted to the floor plates.

Windows in the passenger saloons consist of two parts: the lower part is fixed and composed of double panes, a construction which has favourable thermal

and acoustic qualities, and also ensures an unobstructed view even in winter, as the windows do not dim so easily through water condensation. The upper part has two fixed portions and two sliding single panes mounted in one framing. The sliding portions have deflectors so that a draught-free ventilation is obtained. The complete window set is mounted in the side-wall by means of a rubber profile, and the inner framing is made of polyester.

Seats in the second class portion are made of a framing partly of stainless steel, and the seats, backs, and head cushions are upholstered with foam rubber. In the first class the seats are covered with plush and in the second class with artificial leather. The exterior sliding doors are made of polyester in a light-steel framing, thus giving smooth operation by hand. Special attention is given to draught and snow phenomena; the construction is so designed that in periods of snow powder no difficulties occur in correct operation of the doors.

Lighting

Lighting is by fluorescent tubes. In the compartments the tubes are mounted on either side of a symmetrical parabolic lowered section in the centre of the roof, thus giving almost equal distribution of the light quantity. Perspex covers have not been fitted, so that the tubes operate at optimum efficiency, and cleaning and maintenance is much easier. The necessary 220 V. a.c. 100 cycles is furnished by 3-kVA. centrifugal mercury converters, which convert the 100-V. d.c. from battery or motor-generator into 220 V. a.c.

For easy cleaning the lavatories are provided with walls of plastic board, set off with stainless-steel strips. The storage tanks are made completely of polyester, and the valves are directly mounted to the tank, thus avoiding draining of the tanks in cold weather. Water for the flushing of the hopper can be operated by a handle which serves the valve, and the water for the flushing of the wash-basin is operated by pedal mechanism.

To reduce weight many interior details are made of light metal or polyester. The entrance doors, inner-window frames, water tanks, ceiling in driver's cab, and front skirt are of polyester; and the window framings, parcel racks, ashtrays, interior fittings and a great number of fillets are made of aluminium alloy.

Heating of the passenger saloons is effected by warm air. The fresh ventilating air is drawn in through grilles in the skirts by a motor-driven fan housed in the underframe. Thence it is blown via an air heater of 35 kW. through insulated ducts under the floor and in ducts along the side-walls of the compartments at floor level. The temperature in the coaches is regulated by thermostats, which switch the heating of the air on and off. In warm weather the fan is used to

provide forced ventilation without heating. The drivers' cabs are heated by electric radiators with a total capacity of 3 kW. and by a ray-heater of 500 W. The windows are warmed by window-heaters of 100 V. with a capacity of 100 to 200 W.

Electrical equipment

The 1,500-V. d.c. is fed via the pantograph to nose-suspended traction motors having an individual rating of 270 h.p., and driving the wheels through resilient gears of 22: 57 ratio. The motors can be notched in five running positions—a series position with full field, with all resistance in circuit for shunting purposes. A deadman device is incorporated in the master controller.

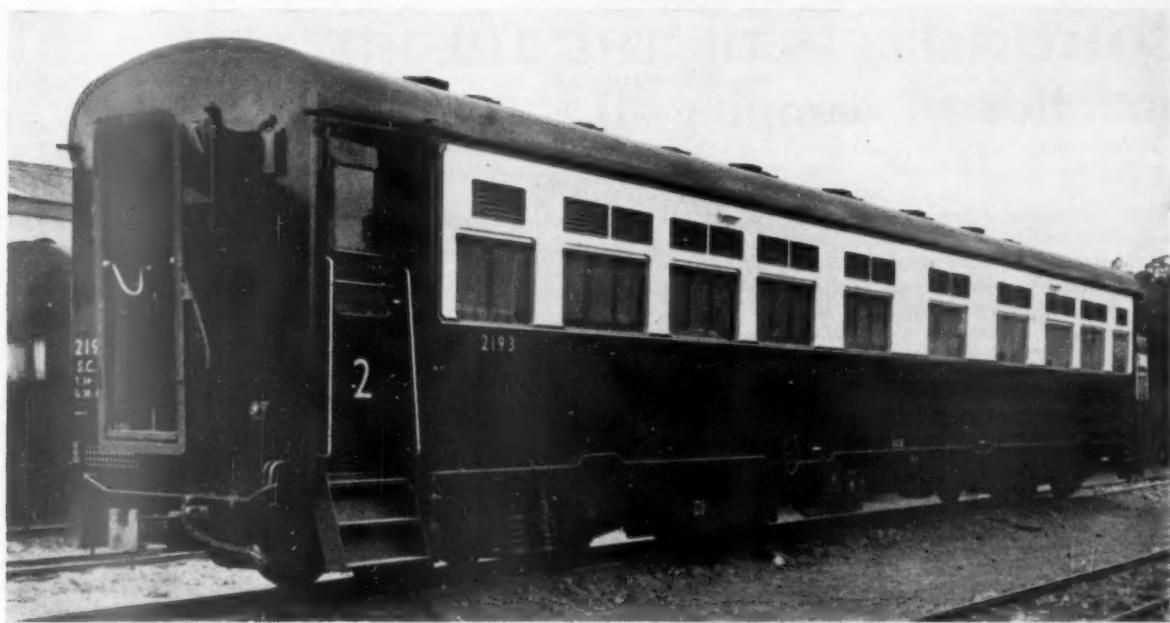
For each four traction motors there is a complete set of electro-pneumatic control gear, which is protected by a quick-acting circuit breaker. The cut-outs are installed in a cabinet on the platform of one end coach and in a cabinet in the luggage room. As the interruption of a short-circuit current is accompanied by a loud bang, owing to the high power involved, careful attention has been given to the acoustical insulation of the cabinet. Moreover, this cabinet had to be adequately protected, as it is located in a passenger compartment.

In collaboration with the Technical Physics Department of the Central Organisation for Applied Scientific Research in the Netherlands (T.N.O.) and Technical University at Delft, a wall construction was designed in such a way that adequate sound insulation and gradual dissipation of the shock wave produced on interruption of the current was ensured. The total wall-thickness of 130 mm. (5 in.) consists of steel plates sprayed with anti-drum material, air spaces, perforated sheets, glass-wool, and perforated syndanio. The circuit-breaker is electrically tested by the Central Bureau of Electrical Power Producers and Consumers while T.N.O. has carried out sound measurements. Experience has shown that the bang is hardly audible when the train is in motion.

Motor-generators of 15 kW. supply current for the 100-V. d.c. control and lighting circuits and auxiliaries. The storage batteries of the nickel-iron type have a capacity of 100 amp. hr. at the 10-hr. rate of discharge and are fitted under the floor.

RAILWAY ELECTRIFICATION IN GERMANY

With the conclusion of an agreement between the German Railways and the State Government of Hesse in connection with a loan of D.M. 200 million, the electrification of the main North to South railway lines is now a certainty. All the other State Governments concerned made similar agreements earlier this year.



33-berth second class coach

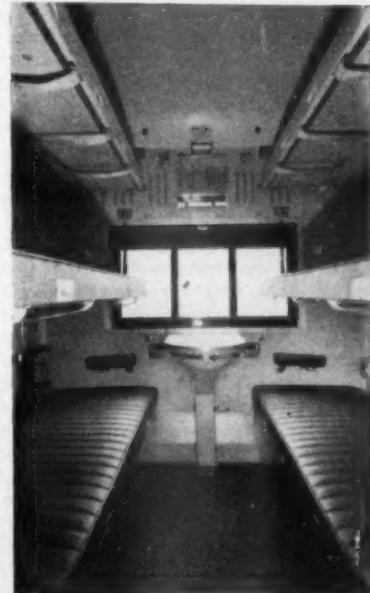
SECOND CLASS COACHES on E.A.R. & H.

Experimental six-berth accommoda- tion on locally-converted coaches

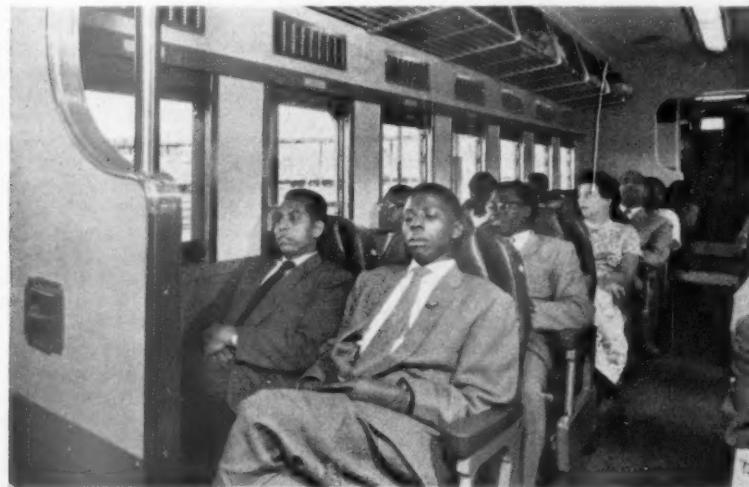
ON October 1, East African Railways & Harbours introduced two experimental 52-seat second class saloon coaches between Nairobi and Mombasa.

Earlier in the year, second class six-

berth accommodation was experimentally introduced on certain trains. Eight of these coaches, each with 33 berths were received from England and one 36-berth coach was converted in the railway workshops. The remainder are being



Six-berth second-class compartment



Second class saloon coach

converted in Nairobi and Dar-es-Salaam workshops and, if successful, it is expected that six-berth second class accommodation will be standard throughout the E.A.R. & H. system in about three years' time.

All locally-converted coaches will be of six compartments with six berths in each, but those imported from England have one three-berth compartment, two sets of three-berth compartments with communicating doors and three six-berth compartments. A three-berth compartment from this stock was illustrated in the Overseas Railway Affairs Section in our September 1 issue.

SOME ASPECTS OF THE THEORY AND practice of damping—II

WHEN mounting dampers across the secondary suspension of a vehicle, two basic modes of oscillation should be borne in mind, namely, body pitching and swaying. Swaying is a complex mode and is a combination of rolling on the bolster springs and lateral motion on the swinglinks. So far as the latter motion is concerned, difficulty is not usually experienced in providing sufficient damping. The rolling component is difficult to damp with hydraulic units since the frequency of the oscillations is often low (about 0.5 to 0.8 c/s) and the moment arm short. The 'across damper' velocities are therefore low with the result that very powerful dampers would be needed.

Since it would be necessary to mount these vertically across the bolster springs, adequate dampers for the swaying mode would be prohibitive in respect of the vertical riding properties. In such circumstances the bolster springs may well be damped out of existence, leaving the oscillation pattern (and natural frequencies) to be determined solely by the primary springs. The usual practice is to specify dampers to deal with body pitching and to space these as far apart as possible so as to obtain maximum effectiveness with respect to damping of the rolling oscillations. This conflict of damping requirements underlines the extreme importance of the suspension characteristics relating to the swaying mode. Resonance conditions in this mode must if at all possible be avoided at the operationally important speeds since control by hydraulic damping is unlikely to prove an acceptable solution.

In the event of difficulty with the swaying mode, a possible solution may be the use of friction dampers spaced widely for maximum effectiveness since these units are not velocity actuated. Reliance on such measures should, however, be regarded as a last resort and should not be allowed to permit carelessness when adjusting the suspension characteristics during design.

Horizontal damping

The excitation frequencies to which vehicles are subjected in the lateral direction are usually lower than those encountered vertically. Consequently, it is possible to use rather more damping to control swinglink motion than could be tolerated across the bolster springs. Reference to Fig. 3 shows that if 0.4 critical damping is present in a system, the steady state response at resonance

Practical aspects of the effects of various amounts of damping on free oscillation in vehicle bogies

by G. H. BATCHELOR, Technical Assistant to Design Engineer (Projects), British Transport Commission

will be better than if 0.2 critical is employed. It is usually found in practice that 0.4 to 0.45 critical damping is suitable for control of body nosing oscillations.

Inbuilt damping

The amount of inbuilt damping may be very low (less than 0.05 critical) or, on the other hand, may reach or even exceed 0.5 critical. The actual amount of inbuilt damping can be influenced at the design stage since certain features encourage the presence of inbuilt damping. Principally these are:

1. Pivot arrangements at swinglink ends
2. Bolster guidance agency in fore and aft direction.

Extensive use has been made of plain pin swinglink ends, particularly at the upper end of the links, with rocking bars and saddles at the lower ends. The amount of friction inbuilt with this arrangement is subject to considerable variation while the vehicle is in service.

Dry friction

Components are greased on assembly with the result that the damping afforded by the pivots may be tolerable in nature (i.e. not dry friction) and may therefore make a useful contribution to the riding properties of the vehicle. After a period in service the components become dry and worn. The inbuilt damping then approximates to dry friction with the attendant possibility of unstable oscillations and erratic response. In view of the difficulties encountered with the pin-pivot swinglink arrangement, various alternatives have been tried. The use of 'knife-edges' is becoming increasingly popular in an effort to reduce friction to the minimum. If these are carefully designed and aligned, a very low order of inbuilt damping can be achieved. A further method of avoiding excessive friction is the use of rubber bush bearings at upper and lower ends of the swinglinks. The British Railways, Southern Region E.5000 class Bo Bo electric locomotives have swinglink bearings of this type and these,

together with the use of traction bars instead of check plates for bolster location has resulted in inbuilt damping of an extremely low order (about 0.05 critical as determined by "wedge" tests). Linear-symmetrical hydraulic dampers are used in this case to provide a further 0.4 critical damping and the riding properties in the lateral direction are very satisfactory. The possibility of modification of the effective swinglink length due to the presence of rubber bushes should never be overlooked. Resistance to rotation afforded by these units will result in a reduced effective length whilst radial flexibility of the bushes may increase the effective link length.

When specifying dampers to control body nosing on the swinglinks, it is necessary to bear in mind the effect these will have on the complex swaying mode. If excessive damping is present laterally, there may be a tendency for the vehicle to sway.

Calculation of the required damping force per unit velocity is carried out as for vertical bolster damping using the relevant moment of inertia and suspension stiffness values.

Primary suspension damping

Damping of the primary suspension is necessary to control two modes of oscillation:

bogie frame pitching, and oscillations associated with body bouncing and pitching.

The relative importance of these oscillation modes is to some extent determined by the proportion of the total vertical static deflection allocated in the primary springs. In cases where most of the vertical static deflection is allocated to the bolster, the presence of comparatively heavy damping at the primary suspension stage is permissible. For instance, a vehicle having leaf springs with a static deflection of 2 in. at the primary stage and helical bolster springs with 3½ in. static deflection was fitted with dampers to ensure about 0.25 critical damping across the secondary suspension. The

damping inbuilt in the primary springs was found by wedge tests to be about 0.5 critical. The riding properties were satisfactory vertically. In this case, the pitching oscillations of the body on the suspension were confined to oscillations on the bolster springs only, the primary springs being so heavily damped that they did not contribute to this oscillation mode. If instead of $3\frac{1}{2}$ in., the bolster static deflection had been only about 1 in., the participation of the primary suspension in the body oscillations would have been essential if satisfactory riding properties were to be achieved. If the primary suspension accounts for a major portion of the overall static deflection, excessive damping may well result in harsh riding. For this reason, the use of laminated springs should not be condemned out of hand for primary suspension providing that a suitable secondary suspension stage is used.

Friction damping

The use of friction damping to control primary-spring oscillations is convenient and can claim to possess definite advantages over hydraulic damping although the disadvantages of friction must be borne in mind. This is due to the nature of the oscillations encountered at a primary stage. The frequencies present are normally rather higher than those encountered at other suspension stages and the full force of rail joint impacts are present. It has already been pointed out that hydraulic dampers are not suitable for dealing with impacts unless special precautions are taken. Considerable care is necessary when mounting such units between axleboxes and bogie frame to minimise the transmission of impacts and also to avoid mechanical damage to the dampers. A further consideration is the damping force/velocity characteristic itself. Records taken both in this country and elsewhere show that bogie pitching is the predominant oscillation mode to which primary springs are subjected (Fig. 8). Consequently, the damping requirements should be based on this mode, aiming for an overall damping factor of about 0.5 (inclusive of inbuilt

damping). The presence of spring drives may contribute to the inbuilt damping and modify its effectiveness and since these devices are normally diagonally disposed in plan equal damping may not be present at all axleboxes.

The damping force per unit velocity is given by :

$$c = 2D\sqrt{mk} \text{ ton per ft/s.}$$

Where k = stiffness of primary springs (per axle) [ton/ft.]

m = effective mass of bogie (sprung portion) [ton sec²/ft.]

D = damping factor

$m = 1/2gl^2$ where $2l$ = Longitudinal spacing of primary springs [ft.]

I = Moment of inertia of sprung portion of bogie about pitching axis [ton ft.²]

g = Acceleration due to gravity [ft./sec.²]

With 0.5 critical damping, bogie pitching oscillations will decay within half a cycle of initiation. (Bogie pitching is mainly due to the occurrence of rail joints at regular intervals.) Sustained bogie pitching oscillations are therefore discouraged.

Hydraulic dampers

The aim when attempting to control and minimise bogie pitching oscillations by means of hydraulic dampers is to arrange for a linear force/velocity characteristic up to cut-off velocity. The cut-off velocity should be a minimum consistent with ensuring that effective damping will be achieved. When $D = 0.5$, the decay of the oscillations will be as shown in Fig. 1. If the maximum compression of the primary suspension is limited to 1 in. by clearances, the maximum possible value of "a" is about 0.25 in. If the damper cut-off velocity is arranged to be slightly higher than the oscillation velocity corresponding to an amplitude of 0.25 in. at the natural frequency of bogie pitching given by :

$$f_n = 1/2\pi\sqrt{2kg^2/I} \text{ cycles/sec.}$$

where I = moment of inertia of sprung portion of the bogie about pitching axis [ton ft.²]

$2l$ = longitudinal spacing of primary springs [feet]

k = primary spring stiffness (per axle) [tons/ft.]

g = acceleration due to gravity [ft./sec.²]

transmission of impacts will be minimised whilst effective damping will still be obtained.

Asymmetrical damping

There is, in view of the severity of impacts sometimes encountered, a case for use of asymmetrical compression/rebound force/velocity characteristics across primary suspension stages. Test runs have been made with various rebound to compression ratios. In certain cases, the presence of rail joint "patter" has been observed to become somewhat less prominent than with symmetrical dampers. It should, however, be stressed that the velocity at which cut off occurs is of very considerable importance both in respect of impact transmission and damper life and this matter should receive close attention together with questions relating to damper mounting.

It has already been mentioned that the friction in leaf springs is not necessarily out of place at a primary suspension stage providing that this stage accounts for only a small proportion of the total static deflection. The suitability of friction damping to deal with impacts is the chief advantage of this medium. The general action is illustrated in Fig. 9 which shows a severe (though not unusual) case of friction damping. Comparatively high spring deflections are caused by the impacts and little impact transmission takes place. No subsequent bogie pitching oscillations take place. In this case, the amount of internal friction in the springs and also that provided by the horn guides is somewhat in excess of requirements and has resulted in aperiodic conditions (compare Fig. 9 and Fig. 1) i.e., the damping was at least critical. As it is often difficult to permanently remove inbuilt frictional damping without appreciable modifications it is preferable to aim for inbuilt

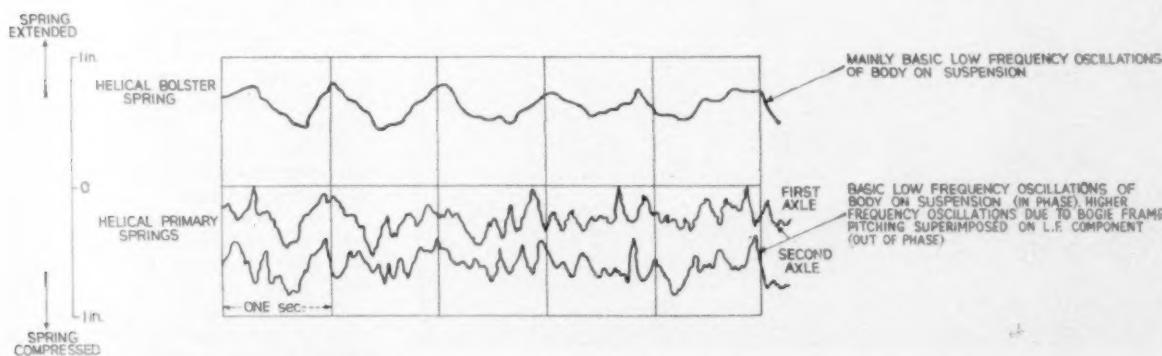


Fig. 8.—Typical records showing oscillations to which primary and secondary springs are subjected



Fig. 9.—Effect of friction in laminated primary springs on potential bogie pitching oscillations

damping that will not exceed overall requirements.

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BULK-CEMENT WAGON for W.A.G.R.

THE pressure discharge system for bulk cement has been adopted on the Western Australian Government Railways with the completion of a hopper wagon in Midland Workshops. The new wagon, coded R.B.C., consists of two separate cylindrical hoppers, each of 13 tons maximum capacity, rigidly mounted on a modified 34-ft. underframe of an R.B. wagon. Tare weight is 14½ tons. The hoppers which were constructed

in the workshops are riveted to the underframe to simplify future maintenance. Each has a filling hatch on top, safety valve, air vent and pressure gauge. Maximum diameter is 9 ft. and capacity 656 cu. ft.



Bulk-cement wagon in service with the Western Australian Government Railways

Pressure-discharge hopper wagon to facilitate handling of bulk cement traffic

Unloading is effected by the use of compressed air from the blower unit supplied via the 4-way flow regulator at a working pressure of 9-10 lb. sq. in., with a maximum of 15 lb. sq. in. From the flow regulator two 3-in. pipes are connected to each hopper, one aerates and pressurises the cement, the other supplies air to the feed cone from which cement is drawn.

Discharge is through a 4-in. pipe on the wagon connected to a flexible hose at the unloading point. The rate of flow is controlled by a lever which regulates the ratio of cement and air entering the discharge line. The wagon can be unloaded in under three-quarters of an hour when feeding into an overhead silo 50 ft. above rail level.

The work was carried out in conjunction with Ready Mixed Concrete (W.A.) Pty. Ltd., pneumatic discharge equipment being supplied by Sir George Godfrey and Partners. At present the wagon is operating from Swan Portland Cement Co. Ltd.'s siding at Rivervale to Bunbury.

PERSONAL

British Transport Commission

MR. C. L. SMITH, F.R.I.C.S., Estate & Rating Surveyor, British Railways, North Eastern Region, who, as recorded in our October 13 issue, has been appointed Surveyor to Railway Sites Limited, began his railway career with the Southern Railway at London Bridge in 1925. He occupied various positions in the Estate & Rating Department, before being appointed, in 1949, District Surveyor (Western District),



Mr. C. L. Smith

Southern Region. In 1951, he was appointed Assistant Estate Surveyor, North Eastern Region, and in 1956 became Assistant Estate & Rating Surveyor, North Eastern Region. Mr. Smith became Estate & Rating Surveyor in 1958, the position he has now vacated.

MR. R. J. HIGGINSON, Senior Assistant (Accounts), Finance Department, Railway Accounts Division, British Transport Commission, has been appointed Assistant to Chief Railway Accountant.

British Railways

MR. I. C. MARSHALL, who, as recorded in our October 6 issue, has been appointed Operating Assistant to the Movement Officer, British Railways, Southern Region, joined the former London Brighton & South Coast Railway in 1920 in the office of the Superintendent of the Line. With the formation of the Southern Railway he transferred to the Freight Train Running Section of the office of the Chief Operating Superintendent. From 1929, he was attached to the London West Divisional Superintendent's Office, during which time he was responsible for the re-organisation and development of the train services in the Isle of Wight. In 1936 he transferred to

the Traffic Manager's Office and was concerned with the timetabling of various extensions of electrification and with the arrangements for the evacuation of the civil population before the outbreak of war. He was appointed Outdoor Assistant to the Superintendent of Operation in 1947, and in the following years undertook an extensive research into train and motive power operation. In November, 1959 he became Assistant (Work Study and Traffic Co-ordination) to the Operating, Commercial and Motive Power Officers, which position he now vacates.

MR. L. W. ROBINSON, F.R.I.C.S., Assistant to the Chief Estate & Rating Surveyor, British Transport Commission, who, as recorded in our issue of November 24, has been appointed Estate & Rating Surveyor, British Railways, North Eastern Region, joined the former London Midland & Scottish Railway in 1934 in London. He served with the Royal



Mr. L. W. Robinson

Artillery during the war and on demobilisation, in 1946, he rejoined the railway as Surveyor/Draughtsman in the London District of the Estate & Rating Surveyor's Department. In September, 1949, he was appointed Assistant to the Estate Officer, South Wales Docks and in 1951 he became Estate Officer, South Wales Docks. He was appointed Assistant to Chief Estate & Rating Surveyor, British Transport Commission in 1955.

MR. B. T. WRIGHT, Assistant (General Purposes) to the Commercial Officer, Waterloo, British Railways, Southern Region, who, as recorded in our October 6 issue, has been appointed General Assistant, began his railway service at Nine Elms Goods Depot in 1912. On demobilisation following the 1914-18 war he moved to the District Goods

Superintendent's Office, Waterloo, and with the grouping of the railway companies transferred to the London East Divisional Commercial Manager's Office in 1924. There he gained experience of terminal and staff problems, particularly in relation to London goods depots. Mr. Wright joined the Traffic Manager's Staff Section at Waterloo in 1930, where he dealt with all phases of staff work for the Operating, Commercial, and Continental Departments, and was promoted to Chief Staff Clerk in 1943. He was appointed Deputy Staff Assistant in 1945, and Staff Assistant (Commercial) in 1948. In 1959 he was appointed Assistant (General Purposes) to the Commercial Officer to deal specifically with rationalisation of freight facilities, closing of unremunerative lines (passenger and freight) and kindred matters.

MR. F. J. WAGSTAFF, Acting District Passenger Manager, Euston, British Railways, London Midland Region, has been appointed District Passenger Manager, Euston.

MR. K. N. SIDEBOOTHAM, LL.B., M.I.N.S.T.T., District Passenger Superintendent, Newcastle-upon-Tyne, British Railways, North Eastern Region, who, as recorded in our issue of November 24, has been appointed District Commercial Manager, London (Midland), British Railways, London Midland Region, commenced his railway career in the District Goods Manager's Office, Manchester, in 1937.



Mr. K. N. Sidebotham

He joined H.M. Forces in 1940 and was demobilised in 1946. In 1947 he became a Traffic Apprentice and after training was appointed Goods Agent, Sowerby Bridge, in 1949. In 1953, Mr. Sidebotham became Goods Agent, Brighouse, and during 1954-55 was attached to the District Goods Manager's Office, Leeds, on commercial development

and research duties. In 1955, he was Acting Assistant District Commercial Manager, York, after which he was assigned to special duties at Regional Headquarters, York. He was appointed Assistant District Commercial Manager (Sales), Lincoln, in 1955, and Assistant District Passenger (Sales), Manchester, in 1958. He became District Passenger Manager, Newcastle-upon-Tyne, in 1959.

MR. A. EDWARDS, Assistant to the Operating Officer, Waterloo, British Railways, Southern Region, who as recorded in our October 6 issue, has been appointed Works Progress Assistant to the Works & Planning Officer, Waterloo, began his railway career with the former Lancashire & Yorkshire Railway in the Carriage & Wagon Department, later transferring to the office of the Superintendent of the Line. After gaining experience at a number of stations and motive power depots on the former London Midland & Scottish Railway he was appointed Personal Assistant to the Divisional Superintendent of Operation, Manchester, in 1935. In 1946 he moved to Euston in charge of the Traffic New Works & Accommodation section and in 1955 he was appointed Joint Works Assistant to the Chief Operating and Commercial Superintendents, Waterloo. Three years later he became Assistant to the Operating Officer, Waterloo.

MR. L. A. METCALF, A.M.I.N.S.T.T., Traffic Assistant to the London Divisional Traffic Manager, British Railways, London Midland Region, who, as recorded in our issue of October 20, has been appointed District Commercial Manager, Leicester, commenced his railway career with the former London Midland & Scottish Railway in 1936 and in 1938 moved to the Office of the Vice-President for Finance & Services. He served with H.M. Forces during the war and returned to railway service in 1946 in the Office of the President of the Executive of the L.M.S.R. During the organisational changes which followed nationalisation Mr. Metcalf served in a personal capacity the Chief Regional Officer, the Chief Regional Manager, and the two subsequent General Managers of the

London Midland Region. In 1955 he was appointed General Assistant to the General Manager, becoming Administrative Assistant in 1958. He was appointed Traffic Assistant to the London Divisional Traffic Manager in 1960.

Overseas

MR. E. J. BORROW, Rhodesian Agent for the Nyasaland Railways Limited and the Trans-Zambezia Railway Co. Ltd., stationed in Salisbury, S. Rhodesia, has returned to the United Kingdom pending retirement.

COLONEL D. B. SINGH, Director, Training, Indian Railway Board, has been appointed Chief Engineer, Northeast Frontier Railway.

MR. H. M. ALEXANDER, Chief Engineer, Nigerian Railway Corporation, has retired from that position.

MR. D. KHANDELWAL, Chief Operating Superintendent of the South Eastern Railway, of India, who has been appointed General Manager, was born in 1912, and joined the former East Indian Railway in 1935 as a Probationer Transportation (Traffic) Officer. In 1942 he was promoted



Mr. D. Khandelwal



Mr. L. A. Metcalf

to Senior Scale and in 1947 he was confirmed as Superintendent Commercial. During 1951-52 Mr. Khandelwal worked for some time as Deputy Chief Operating Superintendent and on the regrouping of the Indian Railways in April, 1952, he became Deputy Chief Operating Superintendent of the Eastern Railway. In 1954, he became the Regional Transportation Superintendent, Bilaspur. Soon afterwards he was posted to the Railway Board as Joint Director Traffic (Transportation). Early in 1956 Mr. Khandelwal was transferred back to the Eastern Railway as a Divisional Superintendent. In 1958 he became Chief Operating Superintendent until he was transferred to the South Eastern Railway in 1959, in the same capacity.

Industrial

COMMANDER F. HOLMES has been appointed Acting Managing Director, Westrex Co. Ltd., in the absence of MR. H. L. MARSTON, through sickness.

MR. C. L. STOKOE, "Monitor" Patent Safety Devices Limited, has retired. The company has merged with D. P. Controls Limited and Newcastle Precision Engineers Limited, and continues under the overall direction of MR. G. V. CARR.

MR. W. E. A. REDFERN, Director, English Steel Corporation Limited, and Managing Director, English Steel Forge & Engineering Corporation Limited, has joined the board of Firth-Vickers Stainless Steels Limited.

BRIGADIER A. LEVESLEY, Director, Edgar Allen & Co. Ltd., has been appointed President, Welded Tool Manufacturers' Export Association, and the Welded Tool Manufacturers' Association.

MR. F. KENYON, Director, William Kenyon Group, has been elected Chairman of the Federation of European Petroleum Equipment Manufacturers.

MR. P. C. WICKENS, Chief Engineer, South Wales Transport Co. Ltd., has been appointed Chief Engineer, Western Welsh Omnibus Co. Ltd.

Institution of Locomotive Engineers

The following is a list of members of the Institution of Locomotive Engineers entered on, or transferred in, the Register of Members since October 24, 1961.

Associate Members:

MR. G. H. BATCHELOR, Technical Assistant to Design Engineer (Projects), British Transport Commission.

MR. A. K. CHATTERJEE, District Mechanical Engineer, North-Eastern Railway of India.

MR. E. INHEDLER, Diesel Traction Engineer, Sulzer Bros. (London) Ltd.

MR. B. F. SANDHAM, Technical Assistant (Rolling Stock), British Railways, Central Staff, British Transport Commission.

MR. H. SINGH, Senior Mechanical Engineer (Diesel), Northern Railway of India.

MR. P. M. SWAN, Technical Assistant to the Locomotive Engineer, British Railways, Eastern Region, Graduate

MR. A. J. BROUGHTON, Engineering Apprentice (Mechanical), British Railways, North Eastern Region.

Transfer Graduate to Associate Member

MR. D. MC N. BURTON, Technical Inspector, Running & Maintenance Dept., British Railways, Scottish Region.

MR. H. LOOSLI, Assistant Chief Designer, Swiss Locomotive & Machine Works (SLM), Winterthur, Switzerland.

Obituary

We regret to record the death, on November 7 at the age of 53, of MR. G. F. POWELL, Agent in Boulogne for British Railways, Southern Region.

NEW EQUIPMENT and Processes

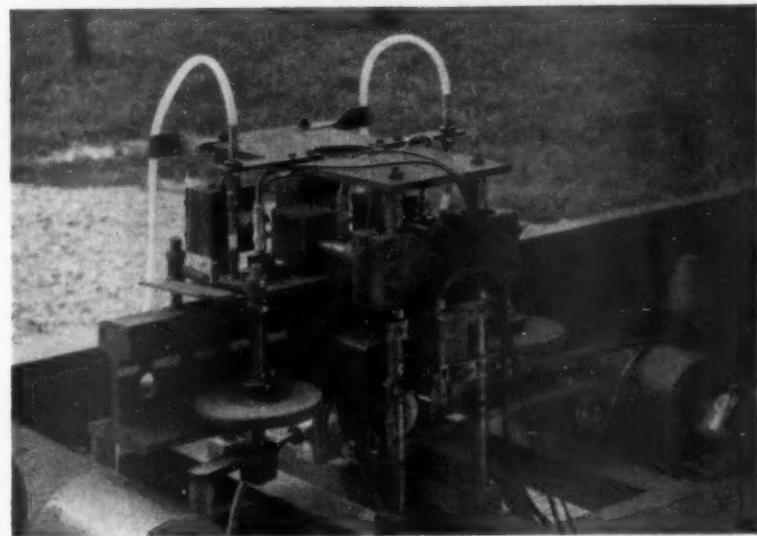
ULTRASONIC RAIL TESTING

A rail testing plant has been developed to enable used rails removed from the track to be tested for defects before they are used again. It is also possible to use the plant for testing new rails before their installation in the track.

The rails to be tested are placed on a 70-metre long electrically-operated roller bed. Conic rollers between the driving rollers bring the rails into correct position on the bed. Before the ultrasonic test, the surface of the rails is cleaned by a grinder and two rotating wire brushes. The grinder is lowered on the rail surface by a servo-motor, only after the rail has entered the cleaning section, and is raised again as soon as the rail leaves the section, so that the grinder is always correctly adjusted to the height of the rail. The risk that the front end of the rail entering the section, may foul the grinder is obviated. Similarly, the two rotating wire brushes are automatically adapted to the height of the rail. Excessive dust is prevented by a water spray. The cleaning of the rail surface is particularly important since rails which have been stored in the open for some time are often rusty, which prevents the effective contact between test head and rail required for ultrasonic testing.

The test heads

When cleaned, the rail enters the test section proper, which is equipped with three test heads. One of these applies a vertical test to the rail at a frequency of 6 megacycles, while the other two heads, which work with a frequency of 3 megacycles, are applied at an angle of 45 deg., for example, one in the direction of the roller bed movement, and the other in the opposite direction. The rail is



thus tested in three different directions so that, in practice, all defects are detected. All three heads are mounted on a sliding shoe, with the rail passing underneath. By means of four sprung guide rollers, the shoe is always in the correct position relative to the rail. The two oblique test heads are so spaced on the shoe that the beam emanating from one of them will, after reflection from the bottom surface of the rail, enter the other head. The coupling of the test heads is obtained by continuous water flow. The belt, which is driven by one of the driving rollers, operates the mechanism for marking detected defects.

Ultrasonic circuit

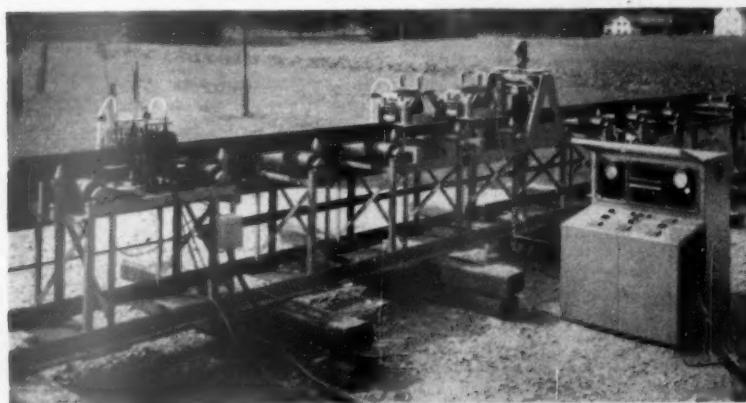
The test heads are connected to two ultrasonic impulse devices so that the vertical tester is connected to one of

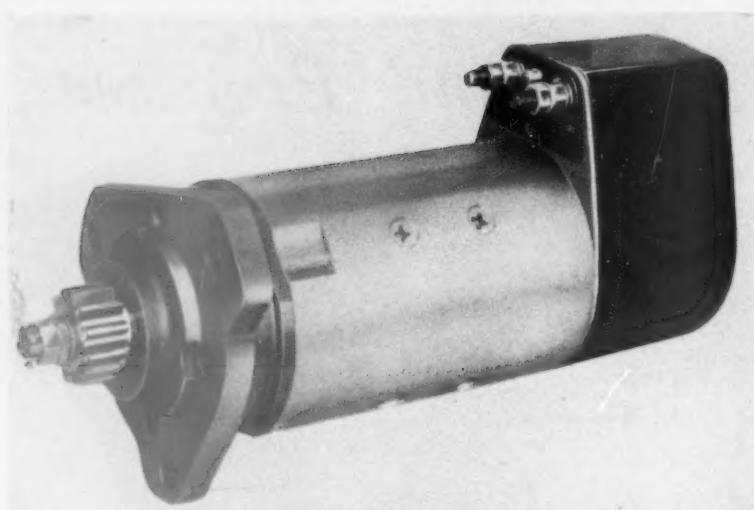
them, and the two oblique testers are, in parallel, connected to the other. Each of the devices is connected with a signal attachment which, by means of two channels, controls the instrument indication. One of these channels controls the echo from the rear, and thus the coupling of the test heads concerned, while the other channel controls the section between emitter impulse and rear echo, and thus responds to any intermediate echoes.

Marking faults

This channel also operates, by means of a relay, the paint marking device. This device is mounted in the test section below the test heads and consists of an endless ribbon which is driven by one of the driving rollers and is thus synchronised with the roller bed speed. The ribbon passes through a paint tank so that it is always supplied with fresh paint. As soon as the signal attachment responds to an intermediate echo, the ribbon is pressed against the rail and leaves a paint mark, indicating the position of the defect.

In common with other switchgear required for the operation of the plant, the two ultrasonic devices and their signal attachments are housed in a cabinet. The main switch can be locked so that the plant cannot be operated by unauthorised persons. All the switchgear components are mutually interlocked in such a way that the plant cannot be damaged by faulty operation. Further details can be obtained from Dr. Richard Gerstner, c/o Dr. Heinrich Fuchs, Thimiggasse 82, Vienna.





DIESEL ENGINE STARTER

The Type SL5 electric self-starter for diesel engines is the latest addition to a wide range of models. It is a 5-in. dia. axial-type motor stated to be capable of doing the same work as most 6 in. models. The reduction in weight achieved is claimed to be 17 lb. in comparison with the manufacturer's 6-in. dia. unit. The cost is lower than that of the 6-in. model.

Further details can be obtained from C.A.V. Limited, Acton, London, W.3.

SUPRA CHROME PIGMENT

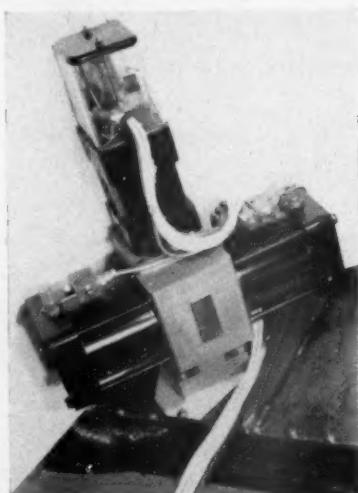
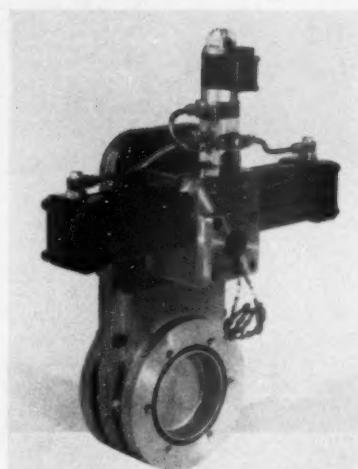
Supra Chrome YS powder is a molybdate lead chrome pigment for heavy transport applications. A special brand is available for sprayed finishes. This is specially controlled during manufacture so as to contain less than 5 per cent of soluble lead in accordance with British Home Office limitations when tested according to B.S.S. 282 1953.

Further details can be obtained from Imperial Chemical Industries Limited, Imperial Chemical House, Millbank, London, S.W.1.

PNEUMATIC TORQUE UNITS

Torque units operated by compressed air to provide rotary motion are available which comprise twin cylinders, the pistons of which are connected by a piston rod on which a rack gear has been generated.

The rack meshes with a pinion keyed to a shaft to achieve rotary motion. Micro-switches, mounted on a cap in the centre piece of the unit, are operated by dimples placed either on the rack, or on the pinion, to indicate the stroke position. Such indication may be used for signalling an operating sequence, or to register the position of, for example, a



gate valve as shown in the centre illustration. The same principle can be extended to include a linear motion as well as the rotary motion as in the

actuator, also illustrated. The shaft can be reciprocated as well as rotated. Switch-gear under the Perspex cover indicates the position of the sliding motion for control purposes.

Further details can be obtained from Vacuum Research (Cambridge) Limited, Quayside, Bridge Street, Cambridge.

INSULATED VEHICLE CONSTRUCTION

Plasticell is a high-strength lightweight closed-cell expanded polyvinyl chloride which is being used as the core of a new sandwich panel having a skin of 20-g. aluminium. The whole panel has been bonded with a bituminous resin adhesive, including the joints in the insulating material, to form a complete body section. This material forms a structural core as well as an insulation, as it has high strength as well as low weight. In the D.40 grade, Plasticell has a compression strength of 40 lb. per sq. in., a density of 2.5 lb. per cu. ft., and provides a high insulation value. This high strength has eliminated the need for a basic body framework.

Further details can be obtained from the manufacturer of Plasticell, Microcell Limited, 26, Kingston Street, Glasgow, C.5, or from the manufacturer of the panel material, the Mann Egerton Co. Ltd., 5, Prince of Wales Road, Norwich, Norfolk.

STEAM CLEANING PLANT

A mobile steam cleaner for plant, buildings, or vehicles, has been tested and approved by the research and development division of the Calor Gas (Distributing) Co. Ltd., and is being handled by Calor distributors. The fuel used is propane and the pump is electrically driven so that the machine can be used indoors, if air supply is adequate for combustion. The minimum requirement is 2,470 cu. ft. per hr.

The cleaner converts 60 gal. of water an hour to detergent-impregnated live wet steam at a controlled pressure of 20-100 lb. per sq. in. Steam pressure can be raised to 90 lb. per sq. in. in 2 min. and water and steam temperature at the cleaning nozzle is 206 deg. F. Fuel consumption is 10.25 lb. propane an hour.

Mains water is fed through a hose to the 10-gal. reservoir where a suitable detergent is added, thence through heating coils to an insulated swivel-handled steam lance. A control enables the operator to rinse down with wet steam only, to leave a clean surface for painting.

Overall weight of the machine is 350 lb. and its operation can be learned in an hour.

Further particulars can be obtained from the Magnus Chemical Co. Ltd., Industrial Estate, Uxbridge, Middlesex.

Ministry of Transport Accident Report

Derailment between Laïndon and Pitsea, British Railways, Eastern Region, on April 18, 1961

Colonel J. R. H. Robertson, Inspecting Officer of Railways, Ministry of Transport, inquired into the derailment of the 12.25 p.m. Down passenger train from Fenchurch Street to Shoeburyness, at about 1.34 p.m., April 18, 1961. At the time the engineers had possession of the Down line in connection with the electrification overhead wiring, and single-line working was in force on the Up line. The train, proceeding in the Down direction along the Up line, was derailed at a runaway catch point which had been clipped in the open position. Two passengers were killed, and 46 people, including three railway servants, were injured.

Gradient and track-layout

The gradient of the line falls fairly steeply from Laïndon in the Down direction towards Pitsea, and so there are three sets of catch points on the Up line between these two stations; they are self-acting double-switched catch points without crossings, and their normal position, in which they are held by the springs, is such as to derail runaway vehicles towards the cess and away from the Down line. The first two catch points are near to Laïndon and are less than half-a-mile apart. The third, where the accident occurred, is about two miles from Laïndon and about 1,000 yards short of Pitsea station.

The train comprised 11 non-corridor passenger coaches, all with steel underframes. The leading coach had a wood-frame body with metal panels, and the next three had all-wood bodies. Of the remainder four had wood-framed bodies with metal panels and three were of all-steel construction.

The engine stopped and overturned within 60 yards of the point of derailment, the result being that the train behind ran at some speed into the equivalent of a fixed obstruction. Because they were screw-coupled and off the rails, the coaches were free to telescope or zigzag, and this and the fact that their body frames were of wood made telescoping easy. In the result there was serious telescoping and derangement of the first four coaches. This absorbed most of the energy of the train's rapid retardation. The remaining seven coaches remained on the rails and suffered little damage.

Evidence given

The District Inspector in general charge of the single-line working said that he was satisfied that the pilotman was competent, and he assumed that the men who had been sent to clip the catch-points were competent, as they had been selected and trained for the job by the permanent-way staff.

He was fully satisfied that the pilotman would ensure that Rule 195 relating to catch-

points would be obeyed. His own chief concern was with the pantograph train working on the Down line, but as it worked slowly towards Pitsea he was able to check that the two catch-points near Laïndon were correctly clipped and manned. The train did not get as far as the catch-point where the accident occurred and so he could not check it in the same way. When the derailed train passed him near Laïndon he estimated its speed at about 20 m.p.h., but it slowed to 15 m.p.h. over the Laïndon catch-points.

The pilotman, who was experienced in his duties, agreed that he had taken full responsibility for the arrangements. He knew the handsignalmen appointed to clip the catch points, and had complete faith in them. When the Up train, on which he was instituting single-line working, was some 150 to 200 yards short of the catch-point where the derailment occurred, he passed the handsignalman in charge of them, who was walking towards it with a clip in his hand.

On his way down on the derailed train, he said that at a range of about 800 yards from the catch-point he saw the handsignalman in charge exhibiting a green hand-signal, his flag being held over the Up line. When the engine was 40-50 yards from the catch-point, the handsignalman with his flag stood clear. He then saw that the catch-point stood open. He shouted to the fireman, who was driving. At that moment he estimated the speed at 15-20 m.p.h.

Brakes applied

The driver of the train said that on this Down journey he properly allowed his fireman, who was shortly to take his "passed fireman" examination, and in whom he had the utmost confidence, to drive. He said that the speed of the train was about 20 m.p.h. when, as the train approached the catch-point about 30-40 yd. away, the pilotman shouted that the points were wrong. The fireman at once made a full brake application, but failed to check the train in the short distance available. The fireman, who was driving, confirmed this evidence.

The local Permanent-Way Inspector and the Ganger in charge of that length of line both said that they were fully satisfied with the competence of the lengthman appointed to act as handsignalman. In his evidence the lengthman said that he had clipped the catch-point on the wrong side. He could not explain his mistake and advanced no excuse. He said that he was used to junction clipping, and had just clipped the Pitsea trailing cross-over points in the normal position, which might have led him to clip the catch-points where the incident occurred in the same position, which would be the derailing position.

Braking tests were carried out on a similar train, the brakes being applied at a point 40yd. short of the catch-point. When travelling at 10 m.p.h. the train stopped 58 ft. short of the catch-point. At 20 m.p.h. it was still travelling at 12 m.p.h. when it passed the catch-point, and ran on for a further 117 ft. before coming to a stand.

Colonel Robertson found that the train

was derailed because the catch-point was wrongly clipped in the normal, *i.e.*, the derailing position. He could find no clear reason for the lengthman's moment of aberration. It may be that his attention was distracted by men working in the vicinity, that he was used to clipping switches in the normal position, and that he had just clipped the Pitsea cross-over in the normal position. All this may explain his failure to check the position of the catch-point before signalling the train over it. Whatever the explanation, there was no excuse for this failure to carry out a simple duty.

The pilotman knew the lengthman and his capabilities very well, saw him on his way to the catch-point, and made a point of ascertaining from the Laïndon signalman that the catch-point was clipped. Colonel Robertson considered that the pilotman was fully justified in assuming that the catch-point was properly clipped.

Extent of damage

The extent of the damage to the leading coaches of the train was partly due to the speed of derailment, but much more to the fact that they had wooden bodies. After its derailment the engine ran on derailed for some 155 ft. before coming to rest on its side, while the fifth coach came to a stand just as it had reached the catch-point. This last provides a better clue to the train's speed, for it seems likely that it was stopped there much more by its own brakes than by the back-thrust of the coach ahead. As the total length of the engine and first four coaches was some 270 ft., it seemed likely that if the train had remained on the rails it would have run on to at least that distance beyond the catch-point before coming to a stand. Comparing this with the distance of 117 ft. run by the 20 m.p.h. test train, this suggests that the speed of approach was a good deal faster than the 20 m.p.h. to which the driver admitted. Both the fireman who was actually driving, and the driver who was in charge knew that the speed over catch-points in single-line working should not exceed 10 m.p.h. They must therefore bear some responsibility for the extent of the damage. Speed limits are laid down for good reasons, and it is a driver's duty scrupulously to observe them.

Wooden coaches

Wooden-bodied coaches are a relic of the past which the British Transport Commission is trying to eliminate as quickly as possible. Such coaches will not run on this particular line after its electrification, which will be completed shortly. The Commission has to balance the need to replace these coaches against other needs for coaching stock, and to balance the coaching stock programme as a whole against the other needs of British Railways. In 1956 there were 14,000 wooden-bodied coaches in service, and by the end of 1962 there will, under present plans, be less than 2,000, including 344 vehicles which will have been retained for special reasons.

Oxmardyke level crossing

The North Eastern Region of British Railways has replaced the eight hand-operated gates of the Oxmardyke level crossing near Staddlethorpe Station on the Hull-Selby line, by two manually operated mechanical lifting barriers which are illustrated below.

These barriers have been designed and manufactured by the North Eastern Region's Chief Signal & Telecommunications Engineer, Mr. A. F. Wigram. They are the first production models of this type and have been evolved after extensive testing of a prototype. They have twin timber booms constructed in exterior quality plywood, which are bolted to fishplates. The booms are pivoted on roller bearings and are fitted with light-alloy fringes. These fringes fold down as the booms are raised and, to control the balance at all angles, sliding weights are utilised. This controlled balance reduces the effort required to raise or lower the booms.

The barriers are operated by the signalman using a single-gate purchase wheel. The drive is by rack and pinion, the latter rotating a slotted arm through 270 deg. while the barrier moves through 85 deg. This gives a slow start and stop with maximum speed realised at 42½ deg. The control of the barrier is, therefore, most precise in the vertical or horizontal positions.

All the mechanism is enclosed in sheet metal over a steel-angle framework and the barrier lights are controlled by automatic contacts.

This type of mechanical barrier is economical to produce, and could be installed at other crossings where power-operated barriers are not justified.

Questions in Parliament

Channel tunnel or bridge

The proposals now before the British and French Governments for the construction of a tunnel or bridge are to be the subject of detailed economic consideration by officials of both countries.

This was announced by Mr. Marples, Minister of Transport, in the House of Commons on November 22.

Mr. Marples said he had had a useful discussion about a Channel link on November 17 with the French Minister of Public Works & Transport, and reached agreement with him about the next steps to be taken on the proposals before the two Governments for the construction of a tunnel or a bridge. Many aspects of these projects required further joint study, and this was to be undertaken by officials of both countries.

Railway termini redevelopment

Mr. Kenneth Robinson (St. Pancras N.—Lab.) asked the Minister of Transport what plans the British Transport Commission had for the major redevelopment of the sites of London rail termini.

Mr. Marples said that the British Transport Commission had at various stages of consideration the redevelopment of all suitable main-line termini in London. Work is proceeding at Holborn Viaduct and Cannon Street Stations.

Railways in Scotland

Mr. Hector Hughes (Aberdeen N.—Lab.) asked the Minister of Transport if he was aware that present rail services to the north of Scotland were prejudicial to the development of industry there; and if he would specify his plans for capital development on diesel trains, railway electrification and other schemes, to be applied to the long hauls to the north of Scotland from the south of Britain, to remedy the situation prevailing in Scotland.

Mr. Marples said that the British Transport Commission was improving services to the north of Scotland by modernising traction on the West Coast and East Coast main lines. They had also introduced express freight services.

Mr. Emrys Hughes (Ayrshire S.—Lab.) asked the Minister of Transport to what extent transport in Scotland would be affected by the proposals for closing railway branch lines.

Mr. John Hay said that in Scotland, as elsewhere, the closure of uneconomic branch lines meant a redistribution of traffic which

would help to develop the best pattern of transport services for the future.

Monmouthshire railways

The Rev. L. Williams (Abercilly—Lab.), Mr. L. Abse (Pontypool—Lab.) and Mr. H. Finch (Bedwelly—Lab.) asked the Minister of Transport what was the nature of the evidence he had received from the Transport Users' Consultative Committee for Wales and Monmouthshire regarding the closure of railway lines in the eastern and western valleys of Monmouthshire; if, in the light of this evidence he would give a direction to the British Transport Commission to substitute a modified passenger rail service in this area.

Mr. John Hay said that the Consultative Committee's report was being studied.

Staff & Labour Matters

Rail pay meeting

Representatives of the National Union of Railmen, the Transport Salaried Staffs' Association, and the Associated Society of Locomotive Engineers & Firemen submitted their arguments in support of their claims for improvements in the rates of pay of British Railways salaried and conciliation staff at a meeting of the Railway Staff National Council—the second stage in the railway negotiating machinery—on November 23.

The representatives of the British Transport Commission undertook to consider the claims and give a reply at a further early meeting of the Council.

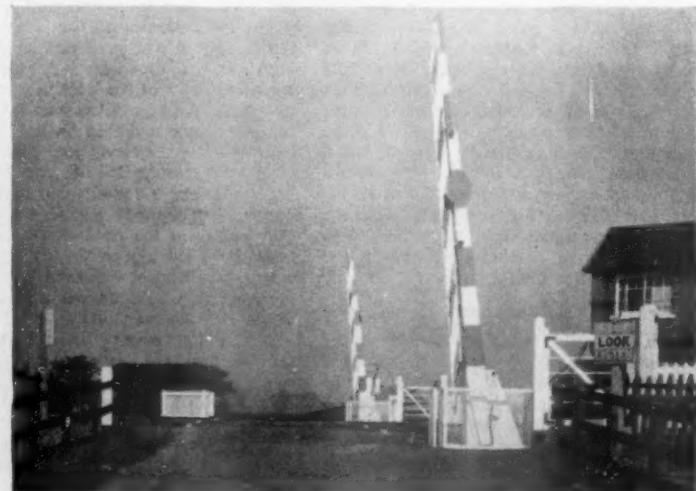
Threatened Strike by Scottish Railwaymen

On November 26, members of the Associated Society of Locomotive Engineers and Firemen, at St. Margaret's Depot, Edinburgh, and Polmadie Depot, Glasgow, voted in support of strike action on December 4 and January 8, in protest against cuts in British Railways Scottish Region rail services. Similar resolutions were passed by members of the Society at Aberdeen and Thornton, Fife.

It is understood that a request is being made to the Society's National Executive to declare the stoppages official.



Manually-operated lifting barriers at Oxmardyke level crossing showing barriers lowered and barriers in raised position



CONTRACTS AND TENDERS

£2.5 million order for diesel-electric equipments

The British Transport Commission's £5 million order, which is the subject of an editorial in this week's issue, included 57 power equipments comprising traction motors manufactured by Associated Electrical Industries Limited, and 6LDA28-B Sulzer diesel engines supplied by Sulzer Bros. (London) Ltd., one of which is illustrated below. The A.E.I. traction



motors are of a new lightweight design with an output of 1,250 h.p. and are designated 253 AY. The power equipments will comprise 228 traction motors each of 360 h.p. The Sulzer diesel engines are the six-cylinder intercooled version of the earlier 1,160 h.p. units and will be built in the Barrow Works of Vickers-Armstrongs (Engineers) Limited.

Henschel-Werke G.m.b.H. has received an order from the State Electricity Commission of Victoria for three Bo-Bo electric locomotives of 1,000 h.p. and 900 mm. gauge for the brown-coal workings. The electrical equipment is to be supplied by Siemens Schuckertwerke A.G.

British Railways, London Midland Region, has placed a contract with Plasser Railway Machinery (G.B.) Limited for the supply of 19 Plasser & Theurer sighting and lifting conversion units of the Type Plassermatic VKR-04 PX-10. This completes an order for 22 of these units by the British Transport Commission.

British Railways, North Eastern Region, has placed the following contracts:

McLaughlan (Knottingley) Limited: earthworks in connection with the new marshalling yard at Healey Mills;

C. Camping (Goole) Limited: overhaul of the coaling plant at Dairycotes Motive Power Depot, Hull;

Quibell & Son, Ltd.: alterations to warehouse, Railway Street Goods Depot, Hull;

Berwick Building Co. Ltd.: erection of a new signal box at Gateshead;

Firth, Blakeley, Sons & Co. Ltd.: construction of signal gantries for use by the Chief Civil Engineer, York;

Henry Berry & Co. Ltd.: supply of a 30-ton down stroking hydraulic press for use in the maintenance of hydraulic buffers at Shildon Wagon Works;

Ruddock & Meighan Limited: raising

the superstructure and alterations to the approaches and wing walls of Bridge No. 178 at Darfield, on the Leeds-Derby Line;

K. S. Construction Co. Ltd.: construction and erection of yard lighting at the new Tyne Marshalling Yard;

John Boyd & Co. (Engineers) Ltd.: 30-cwt. overhead travelling crane for Gateshead Freight Terminal.

British Railways, Southern Region, has placed the following contracts:—

R. Mansell Limited: improved staff accommodation at Waterloo & City Railway Depot;

G. E. Wallis & Sons Ltd.: accommodation for accounting machines at Dorking North;

Rective Electrical Co. Ltd.: installation of electrical services in carriage servicing shed at Slade Green;

Geo. Jones & Son (Contractors) Ltd.: station renovations at Templecombe;

Campbell & McGill Limited: repairs to Rockley Viaduct at Hamworthy Junction;

W. & C. French Limited: new footbridge at Grove Park Station at extension of electrification;

P. & M. Contractors Limited: station renovations at Kearsney;

Alfred Bagnall & Sons Ltd.: renovation of carriage inspection sheds at Durnsford Road, Wimbledon;

S. M. Tidy (Public Works) Limited: construction of new roadway at Newhaven Harbour;

Durable Asphalte Co. Ltd.: repairs to roofs at Woking Station;

John E. Wiltshire & Co. Ltd.: station renovations at Rochester;

Wm. Latimer & Co. Ltd.: cleaning and painting of bridges at Ashford District;

Aubrey Watson Limited: repairs to Pooler River Bridge at Catford;

R. Robinson & Co. (Contractors) Ltd.: removal of Burney Street Bridge at Greenwich.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Australia:

100 wagon sets cast-steel freight bogie parts, comprising side frames, bolsters, brake beams, and bolster control device parts.

The issuing authority is the Secretary, Victorian Railways, Melbourne, C.I., to whom bids should be sent. The tender No. is 62,126. The closing date is December 13, 1961. The Board of Trade reference is E.S.B./36078/61.

From Ceylon:

8 sets of steel castings for wagon bogies, comprising side-frames, bolster and centre pivot, to specified drawings.

The issuing authority is the Ceylon Government Railways. Bids should be sent to the Chairman of the Tender Board, Ministry of Transport & Works, P.O. Box 547, Colombo. The closing date is December

6, 1961. The Board of Trade reference is E.S.B./34337/61.

From Egypt:

313 tons of lubricating oil.

The issuing authority is the Egyptian Railways. Bids should be sent to the Purchases & Stores Department, Railway Building, fifth floor over Shoubra Subway, Cairo. The tender No. is E.R.359.G./3/1203. The closing date is December 9, 1961. The Board of Trade reference is E.S.B./34604/61.

From Formosa:

Axles for locomotives, TRA drg. No. 1-354, materials to be conformed with specification JIS-SFA55 or ASTM designation A236-52T, classes D or G: 4 A145, 10 A155, 1 A175, 3 A180, 10 A185, 15 A205, 6 A210, 3 A212, 4 A225a, 1 A234, 30 A 236, 6 A245, 2 A165, 30 A175, 4 A180a, 40 A180b, 2 A195

30 sets wheel and axle of type 12-ton long axle, Drg. No. DVB4105

20 sets wheel and axle with roller bearing for TP32700 type passenger car, Drg. No. TXPR13189, TXPR13192

4 sets wheel and axle with roller bearing for SP32700 type passenger car, Drg. No. DA17156, DA16548-3

120 solid wheel for TP32600 type passenger car, Drg. No. PC8999.

The issuing authority is the Central Trust of China, Purchasing Department, 68, Yen Ping Nan Road, Taipei, Taiwan, to which bids should be sent. The tender No. is GFA-10652. The closing date is December 8, 1961. The Board of Trade reference is E.S.B./30338/61.

From Greece:

3,000 pairs of fishplates, Krupp type, to Hellenic State Railways, drawing No. 2893.

The issuing authority is the Purchasing & Stores Department, Hellenic State Railways, 34 Themistocleous Street, Athens, to which bids should be sent. The tender No. is 5292. The closing date is December 8, 1961. The Board of Trade reference is E.S.B./35784/61.

From Portuguese East Africa:

Supply of ticket printing machines.

The issuing authority is the Ports, Railways & Transport Department of Lourenco Marques, to which bids should be sent. The tender No. is 40/61. The closing date is December 6, 1961. The Board of Trade reference is E.S.B./354921/61.

From Thailand:

600 steel axle box per drawing No. G.Z.-2108 and specification No. SM-17/2503, SM-27/2504.

The issuing authority is the State Railways of Thailand. Bids should be sent to the Stores Section. The tender No. is 04421. The closing date is December 18, 1961. The Board of Trade reference is E.S.B./36030/61.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

NOTES AND NEWS



Model of the proposed air terminal to be built over Victoria Station

British United Airways' terminal. Work started on November 13 on the £100,000 passenger terminal for British United Airways at Victoria Station, Southern Region, British Railways. Built over platforms 15 to 17, the terminal will complete the rail-air link between Victoria Station and Gatwick Airport. A bridge will connect the terminal with platforms 11 to 17 by means of stairways leading down from it enabling passengers to go straight to their trains after checking in for their flights. The foundation work was initiated at a ceremony by Mr. W. T. Fearne, Stationmaster, Victoria, and Mr. F. A. Laker, Executive Director of British United Airways. The illustration shows a model of the proposed terminal.

Mr. R. G. Grout. In the editorial which appeared on page 586 of our issue of November 24, Mr. R. G. Grout was incorrectly described as Chairman & Managing Director of the Atlantic Steam Navigation Co. Ltd. He is Chairman & Managing Director of the General Steam Navigation Co. Ltd.

Benguela Railway during 1961. In the editorial note in our November 10 issue, we published operating results for the first nine months this year of the Benguela Railway. An operating deficit of £437,944 was incorrectly given. In fact the company had net operating receipts of £2,589,875 for this period, and for the same period last year net operating receipts of £2,656,870.

Continuous furnace line at Crewe. A continuous furnace line for the forming, hardening, and tempering of heavy locomotive springs has been installed at Crewe Works on the London Midland Region of British Railways. The installation was carried out by the Incandescent Heat Co. Ltd. and its associate, Controlled Heat & Air Limited.

Passenger enquiries at Kings Cross Station. The Eastern Region of British Railways has equipped the passenger train enquiry office at Kings Cross Station with exclusive Post Office telephone extensions. Instead of ring-

ing the Kings Cross exchange persons making passenger train enquiries will from January 1, 1962, be able to ring a special number, Terminus 3355, and be connected directly to the enquiry bureau.

Colne Valley line passenger service withdrawal. The Eastern Region of British Railways is to withdraw the passenger train service between Haverhill and Chappel & Wakes Colne via Halstead on the Colne Valley line from January 1, 1962.

E.R. Sectional Council tour. The Staff Side Chairmen and Secretaries of Sectional Councils 1, 2 and 3, of the Eastern Region of British Railways toured the London Tilbury & Southend Line recently. Mr. J. W. Dedman, Line Traffic Manager, London Tilbury

& Southend Line, conducted meetings with the staff representatives at six centres. The illustration below shows, left to right: Mr. H. J. Fordham, Vice-Chairman, Sectional Council No. 3; Mr. H. James, Sectional Council No. 1; Mr. W. G. Doughty, Secretary, Sectional Council No. 2; Mr. A. Goldfinch, Secretary, and Mr. H. Tavener, Chairman, Sectional Council No. 4; Mr. S. Eccles, Staff Assistant to Line Traffic Manager; Mr. J. W. Dedman; Mr. J. W. Davies, Secretary, Sectional Council No. 1; Mr. W. D. Chopping, Chairman, Sectional Council No. 3; Mr. R. Arnott, Movement Superintendent; Mr. P. R. Gillett, Public Relations Officer; Mr. E. W. Porter, Chairman, Sectional Council No. 2, and Mr. J. L. Simpson, Running & Maintenance Engineer.

Sea freight diverted to rail. The Dundee, Perth & London Shipping Co. Ltd., has chartered special trains from the Scottish Region of British Railways to carry freight, hitherto carried by sea, to the company's London terminal at Stratford. The special trains are operating an overnight service on Tuesdays, Thursdays, and Saturdays.

Lunchtime talks for railway staff. The North Eastern Region of British Railways is to give a series of 10 lunchtime talks to its headquarters staff at York; each talk will be given by a Regional officer. The talks will be quite informal and will be designed to explain to the staff the problems, aims and objects of the Region.

Railway Queen's London visit. The Railway Queen of Britain, Miss Susan Garside, was the guest of the British Railways, Southern Region, Horticultural Society London East and Central sections, at their annual dinner at the Chatham Rooms, Victoria Station, on November 11.

Bedford-Hitchin service to be withdrawn. The London Midland Region and the Eastern



Mr. J. W. Dedman with representatives of Eastern Region sectional councils

Region of British Railways are to withdraw the passenger service between Bedford (Midland Road) and Hitchin (Eastern Region) on January 1, 1962. Cardington, Southill, Sheffield and Henlow Camp Stations will be closed to passengers.

N.E.R. branch closure. The North Eastern Region of British Railways is to close the Brackenhill freight branch line from January 1, 1962.

Trimdon Station to close. The North Eastern Region of British Railways is to close Trimdon Station, on the Ferryhill-West Hartlepool line, on January 1, 1962.

F.B.I. scholarship scheme. Mr. R. E. Castillo Valdez was presented with a certificate as the 500th scholar to visit Britain under the Federation of British Industries scholarship scheme by Sir Keith Joseph, Minister of State, Board of Trade, on November 28.

Great Ayton Station becomes a halt. The North Eastern Region of British Railways is to convert Great Ayton Station, on the Middlesbrough-Whitby line, to an unstaffed halt and public delivery sidings.

Institute of Reprographic Technology. A new professional institute—the Institute of Reprographic Technology—was inaugurated on November 23. Its aims are to increase the efficiency and technical ability of those practising reprographic technology and entrance is by examination.

Locomotive Depot at Margam. Plans have been completed by British Railways, Western Region, for the construction at Margam (Glamorganshire) of a servicing depot for diesel locomotives adjacent to the marshalling yard.

Institute of Traffic Administration. The London Centre of the Institute of Traffic Administration is to hold a "Brains Trust" on December 5, at the Kingsley Hotel, Bloomsbury Way, London, W.C.1. Members of the panel will include Mr. A. E. Cooper, Conservative M.P. for Ilford South, Mr. T. J. D. Morris, Transport Manager, Chiswick Products Limited, Mr. T. O'Leary, National Secretary, Transport & General Workers' Union, and Mr. G. Rogers, Labour M.P. for North Kensington.

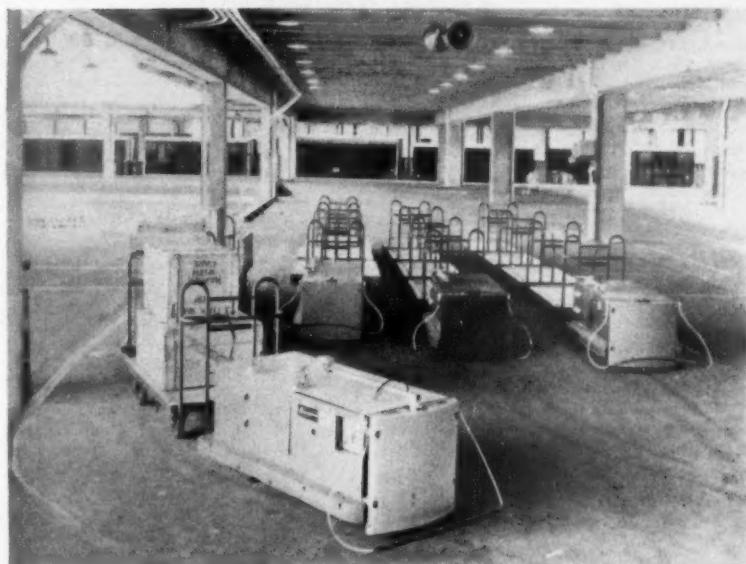
Wagon company merger. The board of the Gloucester Carriage & Wagon Co. Ltd. has recommended acceptance of the offer of a merger by Winget Limited.

Railway Club annual dinner. The annual dinner of the Railway Club was held at the Danish Club, Knightsbridge, London, S.W.1, on November 25. In the unavoidable absence from London of the President, Mr. D. S. M. Barrie (whose appointment as Assistant General Manager of the North Eastern Region of British Railways was announced recently) the Chair was taken by Mr. Charles E. Lee, Vice-President, supported by his fellow Vice-Presidents. The principal guest was Brigadier C. A. Langley, Chief Inspecting Officer of Railways, Ministry of Transport.

Annual conference. The Institute of Traffic Administration is to hold its annual conference at the Savoy Hotel, Blackpool, from May 18-20, 1962.

DRIVERLESS TRACTORS IN PARIS

see page 563 November 17 issue



Driverless "Robotugs" installed at Danzas Goods Depot, Paris

N.E.R. delivery sidings to close. The North Eastern Region of British Railways is to close Beeston public delivery sidings from January 1, 1962.

100-m.p.h. diesel locomotive. The Falcon, a new 2,800-h.p. diesel locomotive, capable of 100 m.p.h., is making trial runs between Norwich and London on the Eastern Region of British Railways.

Electric glass components company. Associated Electrical Industries Lamp & Lighting Co. Ltd. and the General Electric Co. Ltd. have formed a company, registered as Glass Tubes & Components Limited, to take over glass manufacture and sales not covered by the jointly owned Glass Bulbs Limited.

Metalastik Limited. This year Metalastik Limited is making donations to charity instead of sending Christmas cards. The company hopes that its many friends will approve the action.

Western Region ambulance awards. Mr. J. R. Hammond, General Manager, British Railways, Western Region, presented meritorious awards for first aid to four members of the Mechanical & Electrical Engineer's staff at Bristol on November 17. Mr. Hammond also presented awards to two members of the Traffic Department staff in connection with an accident at Paignton.

Hyde Park underground garage. The Minister of Transport and the Minister of Works have authorised the Westminster City Council to begin work on the underground garage for which powers to make a site available were obtained in the Hyde Park (Underground Parking) Act, 1961.

Trailer plate regulations. Statutory Instrument 1961 No. 2084 entitled The Motor Vehicles (Construction & Use) (Amendment) (No. 4) Regulations, 1961, coming

into operation on December 1, relaxes the requirements as to the size of reflex lenses used in trailer plates. In future, $\frac{1}{2}$ in. will be the minimum diameter. Copies of the Instrument may be obtained from H.M. Stationery Office, price 3d.

Aerograph-De Vilbiss factory. The Aerograph-De Vilbiss Co. Ltd., has moved into factory and administration premises at West House, Bournemouth. The existing sales division office at 47, Holborn Viaduct, London, E.C.1, will continue to handle the company's business in London and the Home Counties.

14th Liège International Fair. The 14th International Fair, at Liège, will be held from May 26 to June 11, 1962.

More visitors to Britain. The number of overseas visitors to Britain in September was 175,000 and the total for the nine-month period was 1½ million, an increase of nine per cent over the same period last year.

Motor-car traffic to Ireland. The Western Region of British Railways is to introduce experimental additional sailings during next summer to cater for the increasing motor-car traffic to Ireland between Fishguard and Rosslare.

Shipping & International Services conference. The second training conference for the staff of Shipping & International Services of the British Transport Commission was held at the School of Transport, Windsor, recently. Among the subjects discussed was the effect on the Commission's shipping services of the proposed channel tunnel or bridge. Mr. G. W. Quick Smith, Adviser (Special Projects), British Transport Commission, was one of the speakers on this subject and Mr. E. T. Marples, Chairman, Institute of Shipping & Forwarding Agents, and Mr. R. A. Lorain, Association of British Travel

Agents, were guest speakers. Mr. J. L. Harrington, Chief Shipping & International Services Officer, B.T.C., opened the conference.

Newport (Mon.) signalling extension. The Western Region of British Railways extended the modernisation and resignalling at Newport, Mon., on November 26, by introducing multiple-aspect signalling on sections of line to the West of Newport Station. These areas are those controlled by Gaer Junction and Alexandra Dock Junction signalboxes, which have been closed, and the lines as far as Park Junction on the Western Valleys line.

Crompton Parkinson and the B.T.C. In the report and accounts for the year ended June 30, 1961, of Crompton Parkinson Limited, the Chairman of the company, Mr. Albert Parkinson, made the following statement: "Many manufacturers such as ourselves have laid out considerable sums of money to meet the highly technical demands of the British Transport Commission. It is, therefore, disconcerting that the nature of this business is unreliable and that despite the inevitable demand to replace steam traction the lack of any continuity of orders decreases the efficiency and must increase the costs and the problems of manufacturers."

Railway Stock Market

There were few movements among foreign rails, but a good feature was provided by a further rise from 19½ to 23½ in Paraguay Central prior lien debentures. Costa Rica ordinary stock was again quoted at 35. Guayaquil & Quito assented bonds at 55 and Chilean Northern 5 per cent debentures held last week's rise to 48½.

International of Central America shares were again quoted at \$13½ and the preferred stock at \$84. Brazil Railway bonds were 2½, São Paulo Railway 3s. units 1s. 9½d. and Mexican Central "A" bearer debentures 57½. Antofagasta ordinary stock remained at 16½ and the preference stock at 35½, while the 4 per cent perpetual debentures were again 40. Nyasaland Railways shares were 11s. and the 3½ per cent debentures 35. Midland of Western Australia unified ordinary stock was 11, while in other directions West of India Portuguese capital stock changed hands at 138.

Canadian Pacifics at \$43½ were virtually the same as a week ago; the 4 per cent preference stock came back from 59½ to 59, and the 4 per cent debentures were 53½ compared with 55½. Calgary and Edmonton 4 per cent consolidated debentures marked 51½. White Pass shares were \$13½.

Compared with a week ago, Gloucester Wagon 10s. shares were quite well maintained at 13s. 6d. on the full details of the take-over offer from Winget. Wagon Repairs 5s. shares have been firm at 26s. 6d., Beyer Peacock 5s. shares kept at 7s. 4½d., but Charles Roberts 5s. shares declined afresh from 4s. 7½d. to 4s. 4½d. on further consideration of the results. In other directions, Westinghouse Brake shares came back from 26s. to 24s. 9d. and business up to 17s. 6d. was recorded in G. D. Peters, but Birmingham Wagon eased from 22s. 6d.

to 21s. 7½d. North British Locomotive at 4s. 7½d. were virtually the same as a week ago. In electricals, English Electric fell sharply from 31s. 6d. to 27s. following the directors' statement indicating the possibility of a lower dividend because of a downward trend in profits. G.E.C. came back from 28s. 3d. to 26s. 3d., and A.E.I. from 33s. 9d. to 31s. 6d. Moreover, B.I.C.C. at 56s. 7½d. were 2s. 4½d down as compared with a week ago, but Crompton Parkinson 5s. shares were little changed at 12s. 7½d. On the other hand, there was a drop from 66s. 6d. to 61s. 6d. in Tube Investments. Leyland Motors fell from 90s. a week ago to 85s. 4½d., although there are expectations that the dividend will be kept at 20 per cent.

Forthcoming Meetings

Dec. 1 (Fri.). The Railway Club, Royal Scottish Corporation, Fetter Lane, E.C.1, at 7.0 p.m. "European international train services," by Mr. E. M. Sanders.

Dec. 2 (Sat.). Permanent Way Institution, Nottingham & Derby Section. Annual general meeting, 12.30 p.m., at Co-operative House, Nottingham.

Dec. 4 (Mon.). Institute of Transport, Darlington group, United Grange House, Road, at 7 p.m. "Wagon construction and maintenance," by Mr. B. Holroyde, Works Manager, Faverdale Wagon Works.

Dec. 4 (Mon.). Institute of Transport, East Anglia section, Eastern Counties Omnibus Co. Ltd., Thorpe Road, Norwich, at 6 p.m. "Transport in the Highlands and Islands of Scotland," by Mr. W. Iain Skewis, Eastern Region, British Railways.

Dec. 5 (Tue.). Institute of Transport, Midland section, Engineering Centre, Stephenson Place, Birmingham, at 6.30 p.m. "The future for British Railways," by Mr. C. R. Stuart.

Dec. 5 (Tue.). Institute of Transport, Edinburgh discussion group, 23, Waterloo Place, at 5.30 p.m. "The future of British ports," by Mr. D. A. Stringer, Docks Manager, East Coast Scottish Ports, British Transport Docks.

Dec. 5 (Tue.). Institute of Traffic Administration, Kingsley Hotel, Bloomsbury Way, W.C.1, at 6.30 p.m. Transport Brains Trust.

Dec. 6 (Wed.). British Railways, Southern Region Lecture & Debating Society, Chapter House, St. Thomas' Street, London Bridge, S.E.1, at 6.0 p.m. "Developments on the Swiss Federal Railways since 1945," by Mr. H. P. B. Beilem, British Railways General Agent for Switzerland.

Dec. 6 (Wed.). Institution of Railway Signal Engineers, at the Institution of Electrical Engineers, Savoy Place, W.C.2, at 6.0 p.m. "Planning and progress of signalling for 50 c.p.s. electrification," by Mr. F. W. Young, London Midland Region, British Railways.

Dec. 6 (Wed.). Railway Students' Association, at the London School of Economics & Political Science, at 6.15 p.m. "Railway passenger traffic," by Mr. D. S. McKenna, Assistant General Manager, British Railways, Southern Region.

Dec. 7 (Thu.). Institution of Civil Engineers, Great George Street, Westminster, S.W.1, at 5.30 p.m. "The most appropriate training for a railway civil engineer," introduced by A. H. Cantrell, S. Stevens, and H. Mallinson.

Dec. 7 (Thu.). Institute of Transport, East Midlands section, City Transport Recreation Club, Leicester, at 1 p.m. "The progress and development of work study within the British Transport Commission," by Mr. E. J. Larkin, Director of Work Study, British Transport Commission.

Dec. 7 (Thu.). Institute of Transport, Merseyside section, Chamber of Commerce, Liverpool, at 6.30 p.m. "Railway problems in a major port," by C. P. Millard.

Dec. 7 (Thu.). Institute of Transport, South Western section, Imperial Hotel, Exeter, at 12.15 p.m. Annual luncheon at visit of President.

Dec. 8 (Fri.). Institute of Transport, Northern section, Royal Station Hotel, Newcastle, at 6 p.m. "The place of the public carrier in Britain," by T. G. Gibb, M.Inst T.

Dec. 9 (Sat.). Historical Model Railway Society, Euston Hotel, London at 2.30 p.m. Annual general meeting.

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Tender documents and particular specification will be available from any one of the following persons on payment of Rs. 25/- (Sh. 37/6d.) for Tender Documents and Rs. 50/- (Sh. 75/-) for the particular specification.

1. The Deputy Chief Mechanical Engineer (General), Chittaranjan Locomotive Works, Chittaranjan, West Bengal, India.

2. The Director General, India Store Department, Government Building, Bromyard Avenue, W.3.

3. The Director, India Supply Mission, 2536 Massachusetts Avenue, N.W. Washington, 8.D.C.

If the tender documents and particular specification are required in India the cost for the same as mentioned above has to be remitted to the Financial Adviser and Chief Accounts Officer, Chittaranjan Locomotive Works, Chittaranjan, West Bengal, India, in cash or by Money Order. The cash receipt or the money order receipt should be sent along with the application to the Deputy Chief Mechanical Engineer (General) for the Tender Documents and particular specification.

The sealed tender documents should reach General Manager, Chittaranjan Locomotive Works, Chittaranjan, West Bengal, India, not later than 12 noon on 8th March, 1962.

The sealed Tender Documents will be opened at 2 p.m. on 9th March, 1962, in Public in the presence of such Tenderers or their representatives as may like to be present.

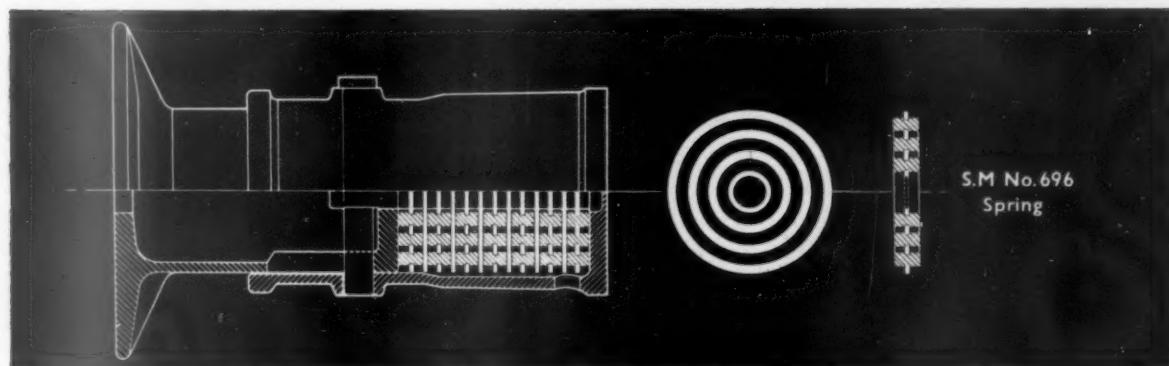
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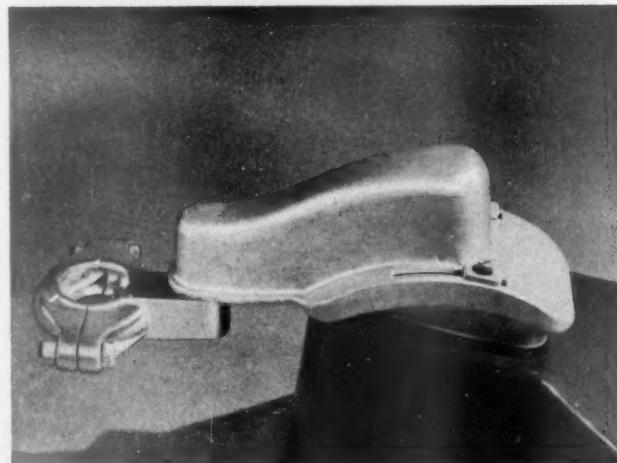
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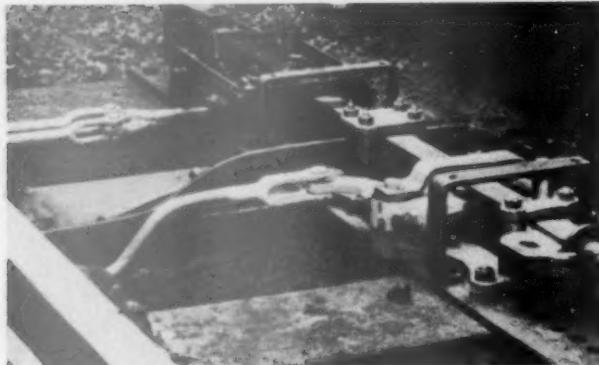
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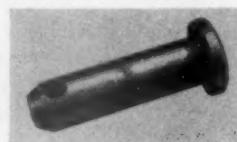
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Right: Anodised aluminium alloy pin $\frac{1}{8}$ " dia. from Glacier dry bearing assembly after three months operation. Dark area on pin is P.T.F.E. lead substance and indicates satisfactory operation.



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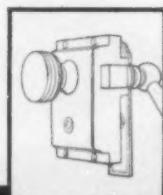
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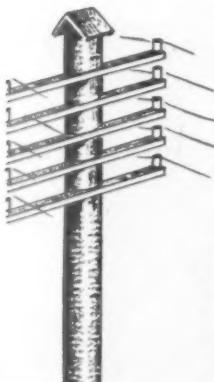
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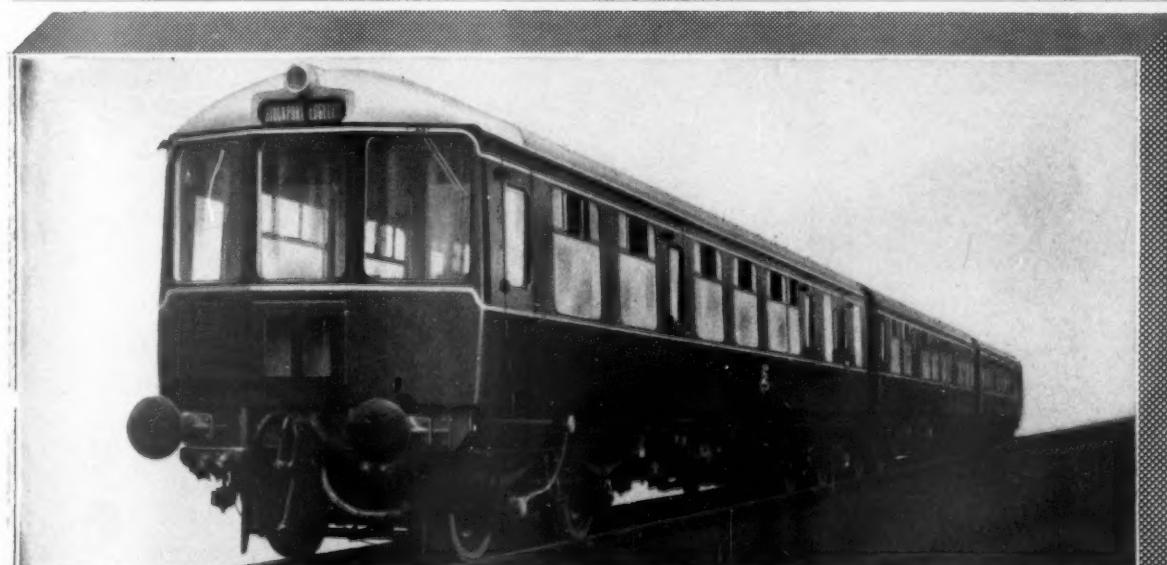
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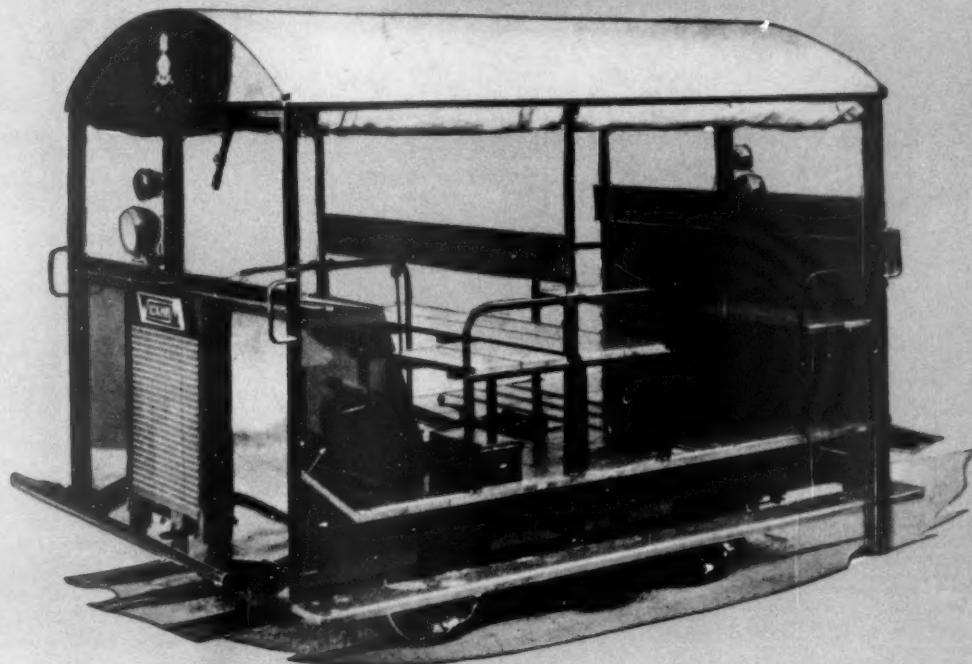
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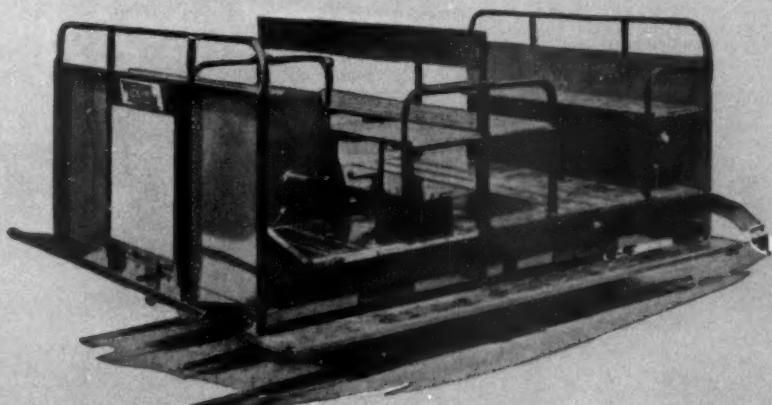


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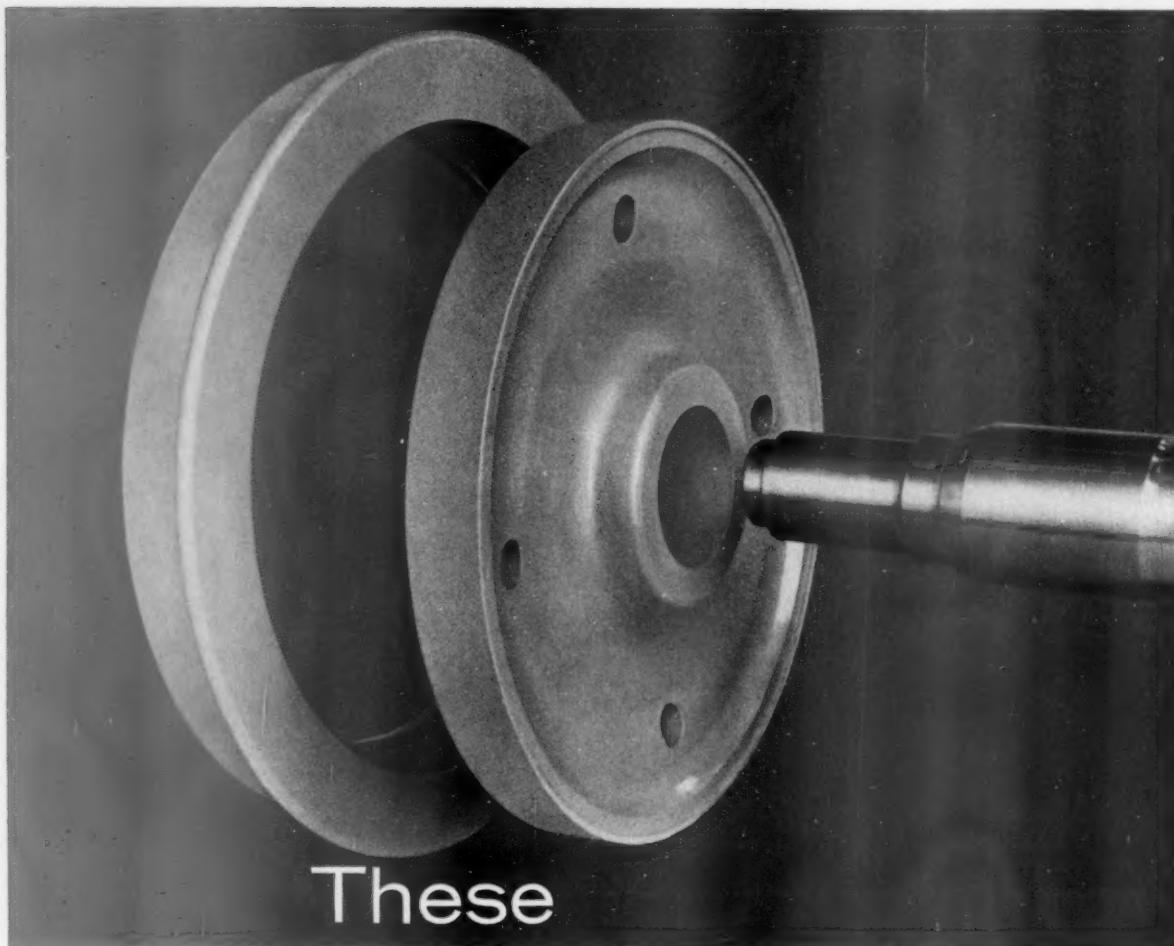
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